

Naval Submarine Base Bangor

Silverdale, Washington

Draft

Integrated Natural Resources Management Plan

December 30, 1999



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Approval

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act (16 U.S.C. 670a *et seq.*, as amended); Department of Defense Instruction 4715.3 *Environmental Conservation Program*; and OPNAVINST 5090.1B *Environmental and Natural Resources Program Manual*.

CAPT David Thomas, USN Date
Commanding Officer
SUBASE Bangor

Ms. Anne Badgley Date
Regional Director
U.S. Fish and Wildlife

Mr. Rick Applegate Date
Regional Administrator
National Marine Fisheries Service

Mr. Jeff Koenings Date
Director
Washington State
Department of Fish and Wildlife

Mr. Art Schick Date
Natural Resources Manager
SUBASE Bangor

Mr. Kent Livezey Date
Natural Resources Manager
Engineering Field Activity, Northwest

RADM William J. Marshall, III, USN Date
Commander
Navy Region Northwest

This document was prepared for Naval Submarine Base Bangor by the INRMP team.

Art Schick – Team Leader/Forester/Environmental Protection Specialist
David Della-Rovere – Leisure Activities Director
Al Decrescenzo – Facilities Planner/Maps
Tom James – Wildlife Biologist
Beverly Pavlicek – Engineering Technician
Steve Ricketts – Coordinator/Writer/Editor
Steve Rothenburg – Game Warden/Park Technician
George Shepherd – Facilities Planning Engineer
Patty Kelly – Environmental Protection Specialist

PERSONS CONTACTED

The following is a list of persons and/or agencies that provided information used in the preparation of the INRMP. Such listing does not imply endorsement of the INRMP.

Washington Department of Fish and Wildlife

Greg Shirato, Region Six, Wildlife Biologist
Gary Kohler, Carnivore Biologist, WDFW
Dr. Briggs Hall, Wildlife Veterinarian

University of Washington, Department of Forestry, Wildlife Sciences Division

Stephan D. West, Professor, Wildlife Sciences, small mammals
David A. Manuwal, Professor, Wildlife Sciences, birds
Kenneth Raedeke, Professor, Wildlife Sciences, big game mammals (deer, elk, etc.)

Executive Summary

Purpose

This Integrated Natural Resources Management Plan (INRMP) guides the implementation of the natural resources program on SUBASE Bangor and associated facilities. Integrated natural resources management is a long-term objective, and this INRMP presents the management for years 2000 – 2004. The INRMP helps to ensure conservation of SUBASE Bangor natural resources, compliance with related environmental laws and regulations, and maintenance of quality lands to support the military mission.

This INRMP is generally laid out with Chapters 1-7 being descriptive of the regulations, the installation and the existing natural resources. Chapters 8 – 16 are the activities that are planned with the implementation of this plan. Chapter 17 describes the funding and implementation process. An Environmental Assessment has been prepared as a separate document to implement this INRMP.

Natural resources are divided into six Management Units. These management units generally follow existing fence-lines or roads within the SUBASE and are labeled Bangor: North, South, East, and West. There are two additional management units at the satellite installations of Camp Wesley Harris, and Toandos Buffer Zone.

Environmental Compliance

The Sikes Act (16.U.S.C.670a et seq, as amended), Department of Defense (DOD) Instruction 4715.3 (*Environmental Conservation Program*), and Department of Navy (DON) instructions OPNAVINST 5090.1B (*Environmental and Natural Resources Program Manual*), and NAVFACINST P-73, (*Natural Resources Management Procedural Manual*), provide the authority for the development of this INRMP. All personnel will comply with the environmental quality policies and procedures specified in DODDIR 4700.4, OPNAVINST 5090.1B, NAVFACINST P-73, and in all applicable laws and executive orders.

The Sikes Act requires, if consistent with the military installation's preparedness mission, that military installations provide for the following goals:

1. Implement an ecosystem based conservation program that provides for conservation and rehabilitation of natural resources in a manner consistent with the military mission.
2. Integrate and coordinate all natural resources management activities
3. Provide for sustainable multipurpose uses of natural resources.
4. Provide for public access for use of natural resources subject to safety and military security considerations.

Scope

This INRMP includes SUBASE Bangor and contiguous Navy properties (7201 ac) which are located along 4.5 miles of salt-water shoreline on the eastern side of Hood Canal, Camp Wesley Harris (388 ac), a small arms firing range 7 miles to the south, and the Toandos Buffer Zone (768 ac) that lies on the western shore of Hood Canal across from SUBASE Bangor.

There is opportunity to provide clean water, quality fish and wildlife habitat, recreation opportunities for residents and employees, and natural resources products. The INRMP documents the planned management of natural resources on SUBASE Bangor, Camp Wesley Harris, and Toandos Buffer Zone.

Relationship to the Military Mission

The general mission of the commands within the SUBASE Bangor complex is to support and maintain a TRIDENT submarine squadron and other ships homeported or moored at SUBASE Bangor.

SUBASE Bangor has adequate land area to support its current mission. A large area on SUBASE Bangor is used for explosive buffers and is managed for forest resources and wildlife habitat without an adverse effect on the military mission.

This INRMP is designed to protect and enhance the lands on SUBASE Bangor and associated facilities. It uses an integrated approach to natural resources management. This plan also describes the outdoor recreational opportunities associated with, or impacting, natural resources for the military and civilian community.

Partnerships

In accordance with the ecosystem management philosophy, SUBASE Bangor is developing partnerships with various agencies to support management of its natural resources. Major partners in implementing this plan are the USFWS, NMFS, and WDFW. Other partners in this effort include universities, other federal and state agencies, tribal governments, private contractors, environmental councils and private citizens.

Planned Major Initiatives

This INRMP includes a description of current natural resources programs and projects, many of which will be continued or completed. There are also new initiatives within this INRMP. These include the following:

- Implementing an ecosystem management philosophy
- Continuing ongoing biodiversity inventories;
- Providing protection for sensitive resources;
- Improving surface water quality and monitoring;
- Creating conditions to support forest development of late-successional habitat.

Unresolved issues within this INRMP include the following:

- Recovery efforts under ESA of habitat and populations of the Hood Canal Chum and the Puget Sound Chinook salmon.

Benefits and Costs

Military Mission Benefits:

Implementing this plan will provide an esthetically pleasing working and living environment and support an efficient and economic execution of assigned missions.

Environmental Benefits:

The plan provides a basis to conserve and protect natural resources. It provides measures to conserve ecosystems and biodiversity and develop increased knowledge of ecosystems through surveys.

Other Benefits:

Both community relations and SUBASE Bangor's environmental image, internal and external to DOD will be enhanced. Quality-of-life for the SUBASE Bangor community and its neighbors will be improved. Natural resource products will support the local economy. Plan implementation will decrease long-term environmental costs and reduce personal and installation liabilities from environmental noncompliance.

Costs:

This INRMP will cost about \$214,500 annually during 2000 through 2004 to implement. Funding will come from a variety of natural resources and environmental funds.

Summary

This INRMP presents a package that will comply with environmental laws, conserve and protect SUBASE Bangor's natural resources, improve the installation's relationship with the public, and enhance the military mission. This plan will not resolve all existing or future natural resources issues. It will, however identify the philosophy, personnel, and means to work toward resolving such issues.

1.0 INTRODUCTION

As part of its mission, the U.S. Navy has chosen to be a national leader in environmental and natural resources stewardship both now and in the future. The vitality of natural resources must be ensured in order to achieve its military mission. As a steward of natural and cultural resources, Naval Submarine Base, (SUBASE) Bangor acknowledges its commitment to be a conservation leader for its cognizant areas.

Conservation is an integration or blending of natural resources management and preservation designed to maintain ecosystem integrity. This blending occurs in this Integrated Natural Resources Management Plan (INRMP), a dynamic document that will be maintained and adapted, as necessary, to reflect updated natural resources information. The development and implementation of this INRMP indicates our commitment to natural resources as reflected in Department of Defense (DOD) Instruction 4715.3 (*Environmental Conservation Program*). The cognizant areas of SUBASE Bangor management included in this INRMP are SUBASE Bangor and the contiguous land of Naval Undersea Warfare Center Detachment Keyport Annex (Annex); and the satellite areas Camp Wesley Harris (Camp Harris) and the Toandos Peninsula Buffer Zone (Toandos).

This INRMP is authorized under the Sikes Act Improvement Amendments of 1997, (16 USC, § 670a et seq., which requires military installations to prepare and implement INRMPs to provide for:

- Conservation and rehabilitation of natural resources.
- Sustainable multipurpose uses of resources.
- To the extent practical, public access for use of natural resources, subject to safety and military security considerations.

The purpose of this INRMP is to chart the management and use of its natural resources; to establish conservation priorities, and; to provide a basis for formulating budgets. It applies an ecosystem management approach to manage many, often conflicting, goals and land uses. This INRMP and the use of the natural resources comply with the legal mandates and, to the extent practicable, are integrated with public ecosystem goals outside the installation's and satellite areas' boundaries.

Ecosystem management is to restore and maintain ecological associations that are of local and regional importance and compatible with existing geophysical components (e.g., soil, water); restore and maintain biological diversity; restore and maintain ecological processes, structures, and functions; adapt to changing conditions; manage for viable populations, and maintain ecologically appropriate perspectives of time and space. (Leslie, et al 1996)

Ecosystem integrity is "the ability to support and maintain a balanced, integrated adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region " (Angermeier and Karr 1994).

1.1 Vision

Our Natural Resources Program is to support the Navy's mission through responsible stewardship of the installation's natural resources. We will utilize integrated natural resources management and principles of ecosystem management to ensure ecosystem viability and biodiversity while providing for compatible multiple uses

1.2 Ecosystem and Adaptive Management Philosophies

Ecosystem management is a goal-driven approach to environmental management that is at a scale compatible with natural processes; is cognizant of nature's time frames; recognizes social and economic viability within functioning ecosystems; and is realized through effective partnerships among private, local, state, tribal, and federal interests. Ecosystem management is a process that considers the environment as a complex system functioning as a whole, not as a collection of parts, and recognizes that people and their social and economic needs are a part of the whole. The goal of ecosystem management is to preserve, improve, and enhance ecosystem integrity. Over the long term, this approach will maintain and improve the sustainability and biological diversity of terrestrial and aquatic (including marine) ecosystems while supporting sustainable economies and communities.

Adaptive management, or management by experiment, is important to the ecosystem. It is more than just monitoring effectiveness of management actions. It requires that the assumptions underlying a management approach, as well as expected outcome, be made explicit before action is taken. Adaptive management involves establishing hypotheses and a framework for analyzing differences between expected and observed outcome. Adaptive management is also about experimentation and probing ecosystems to understand how they operate. Natural resources managers are not just testing a specific management approach; they are trying to understand the structure, patterns, and processes that sustain the ecosystem integrity. Over time, this knowledge enriches the foundation for management. Adaptive management helps ensure that the INRMP will not be a document on the shelf, but a framework for an ongoing management process.

Different philosophies exist pertaining to natural resources management on military lands, ranging from complete preservation to intensive single species or product-oriented management. Various user groups have expressed different, often opposing, views concerning the role of natural resources on military lands. Natural resources managers themselves often disagree as to what constitutes responsible management and stewardship of military lands.

A past trend in management has been to select and manage single species based on their perceived importance. Either as products or commodities, or their status as threatened or endangered species. While this approach can be successful in some instances, single-species management, whether a commercially valuable tree species or an endangered bird, has severe limitations recognized by the scientific and natural resources community. The health of a single species seldom acts as a good surrogate for the health of an entire ecosystem. This type of management often favors a handful of species at the expense of overall ecosystem health, and the underlying complexities.

That is not to say that fish management, wildlife management, forest management, and threatened and endangered species management are not important and will no longer be

conducted at SUBASE Bangor and the associated satellite areas. On the contrary, these types of management activities will be conducted at intensity levels and on scales of time and space that are not detrimental to the ecosystem as a whole. Scientific Monitoring will play a critical role in the process. In effect, ecosystem function and viability will become the standards against which proposed management activities and their impacts are evaluated and, if appropriate, implemented.

For example, forest management is a primary management tool for achieving desired stand structures and diversity over appropriate scales of time and space, and for producing ecological acceptable levels of goods and services including timber commodities. There is, however, no established timber quota; rather the mandate is to provide sustainable multiple uses within the overarching concept of ecosystem management.

SUBASE Bangor considers this approach to be responsible stewardship. Caution must be applied since many of the ecological associations are not yet fully understood due to their unique and complex nature. This INRMP is based on the premise that responsible stewardship and ecosystem management are synonymous and are compatible with integrated natural resources management.

Implementation of any type of management activity whose impacts are not fully understood will be tied directly to implementation of a corresponding monitoring program. The intent is to integrate management activities with on-going scientific monitoring to provide reliable data and identify trends and causal relationships including both positive and negative impacts of management activities. Acceptable levels or thresholds of management intensity will be identified for different species, taxa, ecosystems, and associations. The management guidelines and prescriptions in this plan will be updated periodically as site-specific data become available.

At the completion of each five-year period, another INRMP will be developed to provide on-going management direction based on scientific data and a higher level of knowledge of SUBASE Bangor's and associated satellite areas' ecosystems and their inter-relationships. The long-term goal of the INRMP is to bring together and integrate all management activities (e.g. forestry and wildlife management) in a way that sustains, promotes, and restores the health and integrity of the SUBASE Bangor and associated satellite area ecosystems. Integrated ecosystem management is sound stewardship, and will, over the long term, ensure the maximum return of ecosystems goods and services at minimum cost to the public.

1.3 GOALS AND OBJECTIVES

The fundamental goal of this INRMP is to achieve optimum, sustainable support of SUBASE Bangor, the Annex and associated satellite areas military missions while managing, protecting and enhancing the biological integrity of their lands and waters and providing for multiple uses. Use, conservation, and restoration of the natural ecosystem within the installation's and satellite areas' land and waters will be emphasized. Ecosystem management supports the maintenance of clean water, a variety of quality of fish and wildlife habitat, preservation of threatened and endangered species, recreation opportunities, and flow of forest products to the local community.

To minimize ecosystem degradation and hazardous conditions, it is important to create awareness among land users of good land stewardship. An integral part of SUBASE Bangor's ecosystem management is to provide environmental awareness education to the installation's community, and whenever feasible, the general public.

SUBASE Bangor's INRMP goals are consistent with the DOD "Ecosystem Management Policy Directive," issued in 1994, by the Deputy Undersecretary of Defense (Environmental Security) which states that military installations will use ecosystem management as the basis for future management of DOD lands and waters. The directive specifies five key elements of ecosystem management:

1. **Ecological approach**— The DOD will continue to shift its focus from protection of individual species to management of ecosystems.
2. **Partnerships**— The DOD will form partnerships to achieve shared goals. Ecosystems cross political boundaries, making the need for cooperation, coordination, and partnerships essential for managing ecosystems.
3. **Participation**— Public involvement, communication, and incorporation of public needs and desires into management decisions will be emphasized.
4. **Information**— The best available scientific and field-tested information will be used in making decisions and selecting the most appropriate technologies in management of natural resources.
5. **Adaptive management**— Resources managers will incrementally implement adaptive management techniques as they become known through the dynamic process of applying the best available commercial and scientific data.

1.4 Applicable Federal Laws, Regulations, and Policies

The requirement to generate this INRMP is based on a body of environmental laws, regulations, and policies. Table 1 discusses some specific applicable Federal legislation.

Table 1

Federal Public Laws and Executive Orders	
<i>Conservation Programs on Military Installations (Sikes Act), as amended; Public Law 86-797, 16 United States Code (USC) 670(a) et seq.</i>	Requires Federal military installations with adequate wildlife habitat to implement cooperative agreements with other agencies and develop long-range integrated natural resources management plans. Thereby, it is appropriate to manage natural resources for multipurpose uses and provide the public access to those uses to the extent consistent with the military mission. The act also sets guidelines for the collection of fees for the use of natural resources such as hunting and fishing.
<i>National Environmental Policy Act of 1969 (NEPA), as amended; Public Law 91-190, 42 USC 4321 et seq.</i>	Requires Federal agencies to utilize a systematic approach when assessing environmental impacts of government activities. Sometimes referred to as the mother of environmental impact statement. NEPA proposes an interdisciplinary approach in a decision-making process designed to identify unacceptable or unnecessary impacts to the environment.

Table 1 (continued)

<i>Coastal Zone Management Act of 1972 (CZMA), Public Law 92-592, 16 USC 1451 et seq.</i>	Designed to encourage coastal states to develop coastal area management programs. Non-point source water pollution is reduced through land development regulations. Areas of regulation include sediment and erosion control, flood control, grading control, and stormwater runoff control. The Federal CZMA requires that each Federal agency conducting or supporting activities, whether within or outside the coastal zone, affecting any land or water use or natural resource of the coastal zone, must do so in a manner which is (to the maximum extent practicable) consistent with the state's coastal management program. In addition, Federal permits and licenses, which may affect the state coastal management area must be consistent with the state's coastal management program. Consistency offers the state agencies an opportunity for a positive voice in Federal actions. It ensures that state concerns and policies will be considered by Federal agencies in Federal development projects; and the issuance of Federal licenses and permits.
<i>Endangered Species Act of 1973 (ESA), as amended; Public Law 93-205, 16 USC 1531 et seq.</i>	Protects threatened, endangered, and candidate species of fish, wildlife, and plants and their designated critical habitats. Under this law, no Federal action is allowed to jeopardize the continued existence of an endangered or threatened species. ESA also requires consultation with the US Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) and the preparation of a biological assessment when such species are present in an area that is affected by government activities.
<i>National Defense Authorization Act of 1989, Public Law 101-189; Volunteer Partnership Cost-Share Program</i>	Amends two acts and establishes volunteer and partnership programs for natural and cultural resources management on DOD lands.
<i>Defense Appropriations Act of 1991, Public Law 101-511; Legacy Resource Management Program</i>	Establishes a program for the stewardship of biological, geophysical, cultural and historic resources on DOD lands.
<i>Exotic Organisms, EO 11987</i>	Requires agencies to restrict the introduction of exotic organisms into natural ecosystems on lands and waters which they own, lease or hold for purposes of administration.
<i>Floodplain Management, EO 11988</i>	Provides direction regarding actions of Federal agencies in floodplains, and requires permits from state and federal review agencies for any construction within a 100-year floodplain.
<i>Protection of Wetlands, EO 11990</i>	Requires Federal agencies to avoid undertaking or providing assistance for new construction located in wetlands unless there is no practicable alternative, and all practicable measures to minimize harm to wetlands has been implemented.
<i>Recreational Fisheries, EO 12962</i>	Recognized the social, cultural, and economic importance of recreational fisheries and directed Federal agencies, to the extent practicable and where permitted by law, "to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities".

Table 1 (continued)

United States Codes

<i>Leases: Non-excess Property of Military Departments, 10 USC 2667, as amended</i>	Authorizes DOD to lease to commercial enterprises Federal land that is not currently needed for Public use. Covers agricultural outleasing program.
<i>Federal Land Use Policy and Management Act, 43 USC 1701-1782</i>	Requires management of public lands to protect the quality of scientific, scenic, historical, ecological, environmental, and archaeological resources and values; as well as to preserve and protect certain lands in their natural condition for fish and wildlife habitat. This act also requires consideration of commodity production such as timbering.
<i>Sale of certain interests in land; logs 10 USC 2665</i>	Authorizes sale of forest products and reimbursement of the costs of management of forest resources.

Department of Defense (DOD) Policy, Directives and Instructions

<i>DODDIR 4700.4, Natural Resources Management Program</i>	Requires that the Department of Navy implement and maintain a balanced and integrated program for the management of natural resources.
<i>DODDIR 4715.1, Environmental Security</i>	Establishes policy for protecting, preserving, and (when required) restoring and enhancing the quality of the environment. This directive also ensures that environmental factors are integrated into DOD decision-making processes that may impact the environment, and are given appropriate consideration along with other relevant factors.
<i>DODINST 4715.3, Environmental Conservation Program</i>	Implements policy, assigns responsibility, and prescribes procedures under DODDIR 4715.1 for the integrated management of natural and cultural resources on property under DOD control.

Department of Navy Instructions

<i>SECNAVINST 6240.6E, Environmental Protection and Natural Resources</i>	Assigns responsibility to the Chief of Naval Operations (CNO) and the Commandant of the Marine Corps for the development and implementation of natural resources programs on all land and water areas under the jurisdiction of the Department of Navy.
<i>OPNAVINST 5090.1B, Environmental and Natural Resources Management Manual</i>	Establishes broad policy and assigns responsibilities for the Naval Natural Resources Program. Naval Facilities Engineering Command is assigned overall program management responsibility with authority to establish, coordinate, and promulgate the program; to issue appropriate instructions to the Navy installations for implementation of the various natural resources programs; and to provide professional natural resources services and technical assistance, through Engineering Field Activities, to Navy and Marine Corps Installations. It also directs major claimants and intermediate commands to ensure that subordinate commands support natural resources programs on installations under their control. Installation Commanding Officers are tasked with: <input type="checkbox"/> Requesting and using technical assistance from the appropriate EFA

	<p>in developing and maintaining an effective natural resources program.</p> <ul style="list-style-type: none"> ❑ Providing funding to ensure adequate support of the natural resources program. ❑ Applying practices set forth in approved natural resources management plans. ❑ Assigning specific responsibilities, centralized supervision, and qualified personnel to the natural resources program.
<p><i>NAVFAC Natural Resources Management Procedure Manual, P-73, Volume II</i></p>	<p>Establishes the governing format under which the INRMP is structured. This document addresses all CNO natural resources program requirements.</p>

1.5 Document Outline

1.0 Introduction

1.1 Vision

1.2 Ecosystem and Adaptive Management: This subsection discusses the logic used in arriving at an accepted strategy.

1.3 Goals and Objectives: This subsection details the objectives of the plan and lists the goals to be accomplished.

1.4 Applicable Federal Laws, Regulations, and Policies: This subsection provides a list of all applicable laws and regulations affecting the INRMP.

1.5 Document Outline: This subsection provides a brief outline of the INRMP.

2.0 Background and Military Mission: This section provides a detailed background of existing conditions of the areas covered by this plan.

2.1 Environmental: Provides a description of present climate, physiographic setting, geology, hydrogeology, surface soils, and hydrology.

2.2 Military Mission: Provides a factual description of the military mission of SUBASE, the Annex, Camp Wesley Harris, and the Toandos Peninsula.

3.0 Organizational Structure and Partnerships: This section provides details of the Command structure under which Natural Resources is a component. It details the internal structure that comprises the Natural Resources section of the Public Works Department. This section also lists all agencies that are cooperators, as well as those organizations with which this program has “partnered”.

4.0 Land Use Management: This section gives an overview of land management with respect to natural resources. Each of the four land sections, SUBASE, the Annex, camp Wesley Harris, and the Toandos Peninsula, are discussed.

5.0 Forestry Management Program: This section provides a detailed explanation of the Forestry management Plan and how the Forestry incorporates the principles of Ecosystem Management and Biodiversity. In addition, all applicable laws and regulations are discussed.

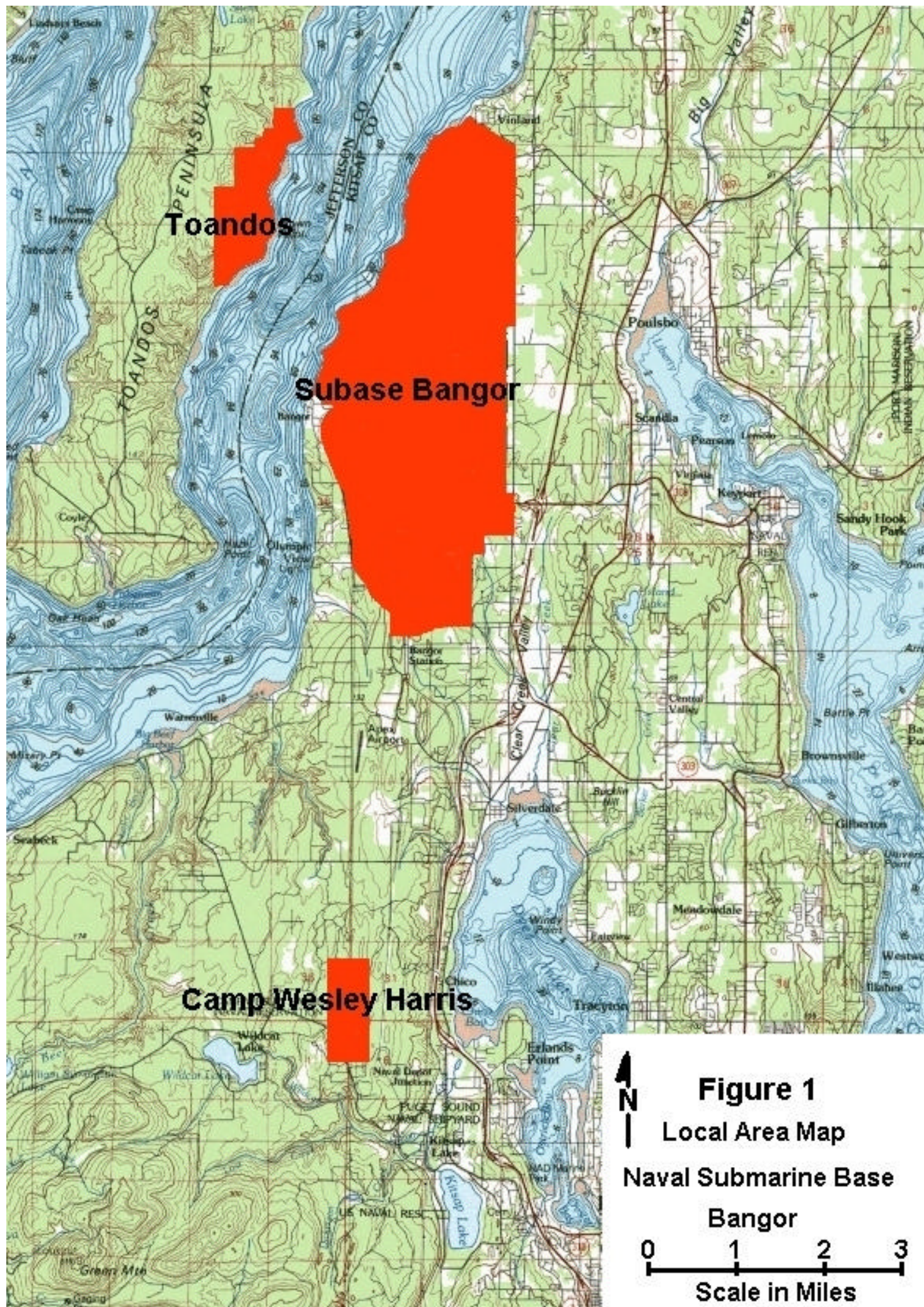
- 6.0 Wildlife Management:* This section presents a list of all applicable laws and regulations; the goals and objectives of the program; as well as a description of past activities and a list of future projects. Species and habitat types are also discussed.
- 7.0 Outdoor Recreation and Environmental Education Management:* This section discusses all outdoor recreation opportunities with respect to the military mission. Activities discussed are hunting, fishing, shell fishing, bicycling, hiking, and boating. This section also describes both the educational responsibilities of the program as well as the educational/training needs of Natural Resource personnel.
- 8.0 Cultural Resources Management:* This section portrays laws and regulations while describing known archeological sites. It also sets forth a logical approach as to what should be done in the event of a site discovery.
- 9.0 Funding:* This section provides a description of all applicable funding sources as well as cost estimates for funds needed to implement this plan.
- 10.0 Implementation Strategy:* This section provides a detailed explanation of how the INRMP will be accomplished. It also provides a mechanism by which conflicting projects can be completed.

2.0 Background and Military Mission

SUBASE Bangor comprises 6,130-acres and it is located approximately 5 miles northwest of Silverdale, Washington in Kitsap County (Figure 1). The Annex is contiguous property to SUBASE Bangor located on the upland portion and comprising 1,071 acres. The upland area surrounding the base supports a semi-rural setting. SUBASE Bangor is situated on the eastern bank of Hood Canal, a long arm of Puget Sound. The Hood Canal adjacent to SUBASE Bangor averages one and a half miles in width, and is bordered on the west by a 768-acre Navy-owned buffer strip on the Toandos Peninsula, Jefferson County. The surrounding Toandos peninsula area is rural in character. Camp Wesley Harris Rifle Range, 388-acres, is situated along the crest of the Kitsap Peninsula between Hood Canal and Dyes Inlet, and adjacent to the Seabeck Highway. Camp Wesley Harris is approximately 8 miles southwest of SUBASE Bangor. The surrounding area is rural in nature.

Major population regional population centers in the INRMP area include Seattle (15 miles to the east), Tacoma (30 miles to the south), and Bremerton (10 miles to the south). The nearest communities to SUBASE Bangor are Silverdale, Vinland, Olympic View, Poulsbo and Keyport. The nearest communities to Camp Wesley Harris are Silverdale and Seabeck. The nearest community to the Toandos Peninsula Security Buffer Zone is Quilcene.

West of SUBASE Bangor, across Hood Canal, lies the Olympic Peninsula. The Olympic Mountains dominate the peninsula, rising to 7,900 feet above sea level. The peninsula is rural on the edges and forested in the interior with the Olympic National Forest and Olympic National Park, providing extensive opportunities for recreational activities. Toandos peninsula is a 10-



mile long projection from the much larger Olympic Peninsula. Toandos forms the west side of Hood Canal across from SUBASE Bangor and is heavily forested.

SUBASE Bangor is well connected to other portions of the county and Puget Sound region via five modes of transportation: highways, public transit, ferries, railroad and air. Although the automobile is the primary mode of transportation in Kitsap County, bus service to SUBASE Bangor is available from some parts of the county. In addition, taxi service is available 24 hours per day. A combination of highway and ferry service provides access from SUBASE Bangor to Seattle and Tacoma. Travel time is approximately an hour and fifteen minutes to Seattle and less than one hour to Tacoma. The major population centers within Kitsap County, Silverdale, Poulsbo, Bremerton, Port Orchard and Bainbridge Island are all between a ten and forty minute drive from the SUBASE Bangor. The Olympic Peninsula and Olympic National Park are accessible by car via the Hood Canal Bridge.

Kitsap County has approximately 1,200 miles of state, county, and city roads. State Route (SR) 3 is the major connection between SUBASE Bangor and the Hood Canal Bridge, Poulsbo, Silverdale, and the southern portion of the Kitsap Peninsula. SR-3 is a controlled access, four-lane roadway between Bremerton and Poulsbo. Trident Boulevard is a six-lane road extending from the base main gate to SR-3. SR-305 intersects with SR-3 near Poulsbo providing access from SUBASE Bangor to Bainbridge Island and the Seattle ferry.

There are seven airfields with jet capability located within two hours of SUBASE Bangor. McChord Air Force Base, a major Military Airlift Command facility, is located 20 minutes south of Tacoma. Airports with commercial jet capability include Seattle-Tacoma International Airport, Boeing Field International (King County Airport), located at the south end of Seattle adjacent to Interstate 5; and Bremerton National Airport located south of Gorst on Route 3. There are also small airfields located in Silverdale and Port Orchard.

The Puget Sound and Pacific Railroad provide freight rail service to SUBASE Bangor, from their Elma-Bangor branch. The 50-mile portion of the railroad from Shelton, Washington, to the base is owned by the U.S. Government and maintained by the Puget Sound and Pacific Railroad. The 11-mile on-site portion of the railroad is an U.S. Navy railroad operation.

Water supply on SUBASE Bangor and the Annex are managed by Public Works Department which operations and maintains 4 Navy-owned wells, 2 water towers, and 2 underground storage tanks. SUBASE Bangor and the Annex utilize 40M-gallons/month or 1-M gallons/day. Most of SUBASE Bangor is on the Kitsap Sewer system, which send 45-M gallons/month to the Brownsville treatment Plant. [This is no longer true, as a sewer system was installed just a couple of years ago.](#) The Annex utilizes septic systems for sewage disposal. Bonneville Power provides electrical power. Telephone service is provided by Sprint United Telephone.

2.1 Environmental Setting

SUBASE Bangor and the associated areas included in this plan lie in the Puget Sound lowland between the Cascade and Olympic Mountain Ranges. Hood Canal, a Washington State designated pristine saltwater inlet of Puget Sound, bounds 4.5 miles of SUBASE Bangor to the west.

2.1.1 Climate

SUBASE Bangor, the Annex, Camp Wesley Harris and the Toandos Peninsula Buffer Zone have an equitable oceanic climate with generally mild temperatures and moderate to heavy precipitation. The area receives an average 47 inches of precipitation annually. This is based on the 40-year mean from the National Oceanic Atmospheric Administration, Bremerton station. The Bremerton station is considered a good approximation of the precipitation for the base. The total annual snowfall is light, approximately 16 inches, and the snow usually melts shortly after reaching the ground. Precipitation occurs throughout the year, but the heaviest rainfall typically is in the late fall and winter months, decreasing into spring.

Summer temperatures average from 65 to 75 degrees, occasionally reaching the 80+ degree.

Temperature data at the Bremerton airport indicate an average annual temperature of 51.3 degrees, with 31-year extremes of 101 and 7 degrees Fahrenheit.

The prevailing direction of the winds is from the south or southwest during the fall and winter, gradually shifting to west and northwest during the late spring and summer.

2.1.2 Physiographic Setting

The region surrounding SUBASE Bangor, the Annex, Camp Wesley Harris and the Toandos Peninsula Buffer Zone lies on the western edge of the central Puget Sound Lowlands (Figure 1XX). This lowland is part of the regional north-south trending structural trough extending from the Fraser River valley in British Columbia to Eugene, Oregon (Pessl, et al., 1989). Hood Canal, a long fiord-like body of marine water, borders SUBASE Bangor to the west. The Olympic Mountains begin just west of Hood Canal and rise to 7,900 feet, creating a significant orographic effect on the local climate.

The physiography of SUBASE Bangor and the Annex is characterized by flat-topped ridges that range in elevation of 300 to 500 feet above sea level. The southern part of the base consists of a till plain, with several north-south trending drumlins. The northern portion of the base (including the Annex) is an upland plateau, incised by several north-south trending post-glacial drainages that discharge to Hood Canal and Puget Sound.

The southern one-third of Camp Wesley Harris contains the bed of a former lake. The northern two-thirds consists of undulating hills and a marshy area of approximately 10 acres containing a shallow pond at the north-central end of the area. The total range in elevation is from 400 to 520 feet above sea level. The Toandos Buffer Zone lies on the west shore of Hood Canal. It tends to be more ridges and sharp canyons than Bangor. The total elevation ranges from sea level to 500 feet.

2.1.3 Geology

The area encompassing SUBASE Bangor and the Annex lies in the Puget Sound Lowland, a broad structural trough, filled with unconsolidated sediments of Miocene to Recent age overlying volcanic bedrock. Several continental ice sheets covered the region during the Quaternary period, resulting in the complex deposition of glacial and interglacial deposits. The latest of these is called the Fraser glaciation and consisted of several ice advances, of which the Vashon Stade was the most extensive and is responsible for depositing many of the water bearing strata

that lie within the facility. There is very little data for Camp Wesley Harris geology and the Toandos Peninsula Buffer Zone geology so it is assumed that geology is similar.

The Quaternary geologic history for the Puget Lowland is outlined by Pessl et al. (1989) and Garling and others (1965), from which much of the following discussion has been summarized. In general, six stratigraphic units are significant to understanding the hydrogeologic system at SUBASE Bangor. These units are, from youngest to oldest:

- Vashon recessional outwash
- Vashon till
- Vashon advance outwash
- Kitsap Formation
- Older sand and gravel
- Tertiary volcanic bedrock

General characteristics of each of these units are discussed below.

Vashon Recessional Outwash consists of a thin veneer of interbedded sand and gravel, deposited by meltwater flowing from the receding glacier. These deposits occur mainly in the large north-south trending outwash channels. Localized perched aquifers, situated in outwash-filled depressions in the upper surface of the less permeable Vashon till provide small quantities of groundwater.

Vashon Till is a lodgment till typically consisting of a hard, gray, heterogeneous deposit resembling concrete. Thickness ranges from a few feet to over 50 feet. It consists of various sized gravels and boulders suspended in a matrix of clay, silt and sand that were deposited at the base of the glacier as it moved across the landscape. Till clasts are derived from local basaltic bedrock sources and from granitic and metamorphic sources located in the northern Puget Lowland and British Columbia. The overall dense, compact nature of the till hinders groundwater flow, making it one of the primary aquitards in the area. It serves as a low permeability base for perched aquifers and the upper bounding unit for confining groundwater zones. This unit may not be continuous across the Bangor area.

Vashon Advanced Outwash consists primarily of coarse sands and gravels beneath the Vashon till. These predominantly glaciofluvial sediments were deposited in the proximal areas in front of and along the sides of the advancing Vashon ice sheet. A typical sequence described by Garling and others (1965) contains poorly sorted gravels at the top, grading down to well sorted, stratified sands and gravels with localized strata of lacustrine silt and clay. This unit is highly permeable and may yield large quantities of water where it extends below the regional water table. Confined groundwater can be encountered where the advance outwash is capped by low permeability till.

The Kitsap Formation consists of laminated silt and clay with an occasional stratum of sand and gravel, deposited in an interglacial lacustrine environment. Thickness can be as much as 150 feet with the top of the unit normally below sea level although it may be encountered as high as 150 feet above sea level. An unnamed gravel is commonly associated with the Kitsap Formation, consisting of iron-stained poorly bedded, fine to cobbly gravels derived from the Olympic Mountains to the west and reworked granitic pebbles from older glacial tills. The finer

grained portion of this sequence is unimportant as a viable source for domestic water supplies. However, the numerous discontinuous sand and gravel strata of the Kitsap Formation and the unnamed gravel yield small supplies of groundwater.

The Older Sand and Gravel incorporates the Salmon Springs Drift and pre-Salmon Springs deposits (undifferentiated), of Garling and others (1965). The Salmon Springs Drift consists of interbedded coarse gravels and sands deposited in a fluvial environment, with local occurrences of glacial till. Pre-Salmon Springs deposits are undifferentiated and include both glacial and non-glacial fine-grained sands, silts, and clays. These deposits can be differentiated from Vashon deposits by the high degree of iron oxidation, and the inclusion of pumice granules and lenses. The top of these sediments occurs near sea level while the base is seldom encountered. The combined thickness is believed to be over 200 feet. The coarser-grained Salmon Springs Drift is capable of supplying large quantities of artesian groundwater and is reported to be the most important groundwater unit on the Kitsap Peninsula.

The Tertiary Volcanic Bedrock predominantly consists of dark, fine-grained basalt. In some areas, secondary mineralization has created an amygdaloidal texture. The total thickness of these rocks is not known but is in excess of 7,000 feet. The dense and extremely impermeable character of these rocks renders them unimportant as aquifers.

SUBASE Bangor lies within a 70-kilometer radius of influence of a probable epicenter for a quake on the Seattle Fault. This fault could generate a shallow crustal event, with potential magnitudes of 7 to 8 on the Richter Scale (Tim Walsh, DNR seismologist, Div. of Geology, pers.comm.). The steep clay slopes adjacent to Hood Canal are the most likely sites on the SUBASE to be unstable during an earthquake.

2.1.4 Hydrogeology

Three distinct aquifer systems in superposition have been identified at SUBASE Bangor. They have been designated, in order of increasing depth, the perched aquifer, shallow aquifer, and sea level aquifer. An intermediate groundwater zone has also been identified within the Kitsap Formation.

General correlation of the site geologic units and corresponding hydrologic units is as follows:

- Vashon recessional outwash (seasonal aquifer)(perched aquifer)
- Vashon till (aquitard)
- Vashon advanced outwash (water table aquifer)(shallow aquifer)
- Kitsap Formation (Kitsap Formation aquitard and intermediate groundwater zones)
- Older sand and gravel (sea level aquifer)

A seasonal groundwater zone likely occurs above the Vashon till throughout much of SUBASE Bangor, although this local condition can be only determined from site-specific subsurface explorations.

Local precipitation is the primary source of water recharging the aquifers in the study area. The bulk of the precipitation occurs during the winter months. The precipitation and subsequent infiltration directly recharges the seasonal zone in the Vashon recessional outwash and the water table aquifer beneath the till. Regionally, the recharge to the intermediate groundwater zones is through flow from the water table aquifer as indicated regionally by vertical pressure gradients that are primarily downward.

Regional groundwater flow in both the water table and sea level aquifers is generally from the upland areas in the center of the Kitsap peninsula, located along the eastern boundary of SUBASE Bangor, toward Hood Canal to the west, and Liberty Bay to the east. The potentiometric surface of the water table aquifer is affected by the presence of deep stream drainages and past channels in the till, which results in local flow direction differing from the regional flow direction. The local groundwater flow direction of the water table aquifer could also be influenced by changes in permeability, aquifer thickness, and recharge and discharge boundaries.

Discharge occurs from the water table aquifer at springs along the shoreline and in stream drainages where the water table intersects the ground surface. The sea level aquifer regionally discharges to Hood Canal to the west and Puget Sound to the east (Garling and others, 1965).

2.1.5 Surface Soils

Till plains are nearly level or gentle undulating areas that were formed when soils and rocks were transported and deposited by the glacial ice sheets. As ice overtopped these materials, the compression from the weight of the ice created till layers that are compacted and weakly cemented together.

Soils located on glacial till on SUBASE Bangor and the Annex are characterized by a moderately compacted till layer, 20 to 40 inches below the surface, overlaying a very compacted till or hardpan layer. Water moves easily through the soils above the till and very slowly through the till layers. These soils frequently have high water tables during the winter months, and lateral flows of water on top of the till layers. The lateral flows surface in depressions, hillside seeps, streams and road cuts. Wetland areas are frequent on these soil types. The Alderwood and Poulsbo soil map units on SUBASE Bangor are located on till plains.

In association with till plains are soils formed from glacial lake sediments deposited when ice dams caused lakes to form and deposit fine sediments. These deposits were subsequently eroded, leaving remnant areas of fine sediments characterized by silt loam and silty clay loam soils with depths to 60 inches. Water moves slowly through these soils, and a high water table is present during the winter months. Lateral flows along platy sediment layers occur during winter months causing slopes greater than 8% to be prone to slippage. Wetlands may be present on these soils. The Kitsap soil map unit on SUBASE Bangor is derived from glacial lake sediments.

Soils on Glacial Outwash Terraces soils are composed of layers of gravel, sand and silt that were deposited from glacial meltwater as the glaciers retreated. These soils are very deep and because of their coarse nature, excessively drained. Soil map units derived from these materials include Indianola, Neilton and Ragnar map units.

Deposition soils occur in small map units in stream bottoms and other depression areas. Poor drainage, surface-water ponding and slight hazards of erosion characterize the soils. Wetlands are frequently associated with these soil map units. Alluvial deposition soils were formed from stream deposition of sands, silts and clays. Soils on the SUBASE within this category are the Custer, Norma and McKenna map units. These soils are found in stream bottoms in level locations. Organic deposition soils are located in poorly drained bottomland areas and are composed of deep deposits of decomposed or slightly decomposed plant materials. The major soil of this type on the SUBASE Bangor is the Mukilteo soil. All of these deposition-derived soils are classified as hydric soils. The soil of this category found on Camp Wesley Harris is the McKenna map unit

Beach soils are sloping sands and gravels above mean high tide, but swept by storm winds. Beaches are classified as hydric soils.

The surface layers of disturbed soils have been substantially modified during construction or removed for use as ballast or landfill material. The subsurface characteristics of the original soil have usually not been altered, and control the movement of water on and through the soils.

The extent and distribution of each of the soil map units on SUBASE Bangor is shown on the Soils Map (Soil Conservation Service, 1980).

2.1.6 Hydrology – Surface Water

SUBASE Bangor drainage consists of five small streams entering Hood Canal and two tributaries of Clear Creek exiting to the southeast, which empty into Dyes Inlet. Three of the streams pass small lakes into Hood Canal. The TRIDENT Support Site Environmental Impact Statement (US Navy, 1974) identified 15 small streams affected by SUBASE Bangor included in the records of the Washington State Division of Water Resources with stream designations 128-140. Recorded stream flows range from a minimum flow of 0.01 cubic feet per second (cfs) to a maximum flow rate of 4 cfs derived from a 2.07 square mile drainage area for the stream passing through Devils Hole Lake. Drainage areas for the streams vary from 0.03 to 3.68 square miles.

Clear Creek drains approximately 750 acres of SUBASE Bangor and the Annex, including the entire Central Core Area. Major drainages from SUBASE Bangor to Hood Canal include streams that flow through Cattail Lake, Hunter's Marsh, and Devils Hole Lake. Overland flow from much of the western portion of SUBASE Bangor is routed to Hood Canal through a series of storm water outfalls.

SUBASE Bangor has four lakes and ponds, and three marshes. The primary function of these water bodies is to provide storm water control, provide quality outdoor recreation opportunities, and also provide habitat for a variety of wildlife species.

2.2 Military Mission

The primary mission of SUBASE Bangor is to provide support to the TRIDENT Missile System. Several major commands that provide direct support and security (SWFPAC, TRF, and MCSF Co.) for the Trident system are located at SUBASE.

“This new generation of stewardship requires that military operators and natural resource managers work together to find management solutions that optimize both operational objectives and natural resource management objectives. I urge all military personnel and civilian staff on military installations to demonstrate the commitment to stewardship that has established DOD as a national leader.” Sherri Wasserman Goodman UDASD (Environmental Security)

2.2.1 SUBASE Bangor and Annex Mission

The general mission of the commands within the SUBASE Bangor complex is to support and maintain a TRIDENT submarine squadron and other ships home ported or moored at SUBASE Bangor and to maintain and operate administrative and personnel support facilities including security, berthing, messing, and recreational services. The TRIDENT system, an advanced submarine-based defensive weapons system, provides for extended operation at sea as a highly survivable and reliable deterrent to hostilities. The three major components of the TRIDENT system are the submarines, the C-4 missiles, and the shore based support activities. Nine submarines of which eight are TRIDENT are currently based at SUBASE Bangor.

The general mission of the Annex is to ship and receive undersea weapons systems in support of Keyport Naval Stations’ torpedo production program. (Don Valley, pers. comm.)

- **Military Mission Requirements:** To accomplish its military mission, SUBASE Bangor and the Annex (including tenant commands) have 5,189 sailors, 401 marines, and 3,621 civil servants and contractors. Camp Wesley Harris has 12 sailors who manage the range and the Toandos Peninsula Buffer Zone utilizes a transient marine force from SUBASE Bangor to perform security patrols.

Training is essential to maintain military readiness. Submarine sailors accomplish their training primarily indoors at the Trident Training facility within the confines of SUBASE Bangor. All the sailors and marines maintain their marksman qualifications at Camp Wesley Harris, which is operated five days a week, Monday through Friday. The commands that utilize the natural settings of SUBASE Bangor are the Construction Battalion Unit 418 Seabees, the Explosive Ordnance Detachment Unit 6 individuals, and the Marine Corps Security Force Company (MCSF Co.). Although little impact from field training such as diving, foot security sweeps, and field exercise activities, the MCSF Co. armored personnel carrier may have impacts to the natural resources if training areas are not coordinated in advance.

- **Natural Resources Needed to Support the Military Mission:** The Explosive Ordnance Detachment, (EOD SUBASE) occasionally performs underwater detonation for training purposes. This activity will be coordinated with all Endangered Species Act requirements for the listed salmonids.

Other groups such as Construction Battalion (CBs) and Marines occasionally hold training exercises in forested areas. These training areas are monitored for compatibility with natural resource management and protection.

New facilities needed to support the military mission may be located in natural resource management areas. This will convert present natural resource areas to developed sites.

- **Effects of the Natural Resources or Their Management on the Mission:** SUBASE Bangor has adequate land area to support its current mission. No changes in the management of natural resources are needed to continue the capability of the installation to support and maintain the TRIDENT submarine squadron and other ships at the SUBASE. A large area on SUBASE Bangor is protected from non-mission development by explosive buffers and is managed for forest resources and wildlife habitat. This does not affect the military mission.
- **Future Military Mission Impacts on Natural Resources:** Adverse environmental impacts of future construction and activity on the SUBASE Bangor will be minimized. The Navy will provide for the development and design of new facilities to appropriately respond to constraints of topography, slopes, and conditions. New facilities will be located where possible within areas which are stable and that minimize negative impacts to water quality and other resource values. Facility construction which will moderately or severely impact natural resource areas should be accompanied by mitigating measures, such as soil stabilization efforts, natural landscape designs, or plantings to reduce habitat loss. The Navy will guide development using National Environmental Policy Act procedures to minimize or mitigate the disruption of identified valuable wildlife habitats (Chap 8.4) and to prevent impacts to listed Threatened, Endangered, and Sensitive plant or animal species.

Natural Resource managers will recommend and assist in design and placement of facilities and training areas that meet applicable federal, state and local air, noise and water quality standards and that are consistent with mitigation measures listed in the Final Environmental Impact Statement for the SUBASE Bangor. Natural resource managers will participate in the NEPA and Biological Assessment phase of facility and training area planning and design.

2.2.2 Camp Wesley Harris Rifle Range Military Mission

- **Military Mission Requirements:** The requirement of this facility is to train submarine personnel and members of the MCSF Co. personnel in the use of the firearms needed to perform their duties.
- **Natural Resources Needed to Support the Military Mission:** Currently, there is no hiking, hunting, fishing, boating, or bicycling allowed at this installation. Much of the forest area is in down-range safety zones.
- **Effects of the Natural Resources or Their Management on the Mission:** Wildlife species have adapted to the noise of operating a firearm range. The effects of this activity have formed the species mix that inhabits this area. While species surveys have not been completed, It is unlikely that the military mission will have current effects on the diversity or composition of these species.
- **Future Military Mission Impacts on Natural Resources:** Training requirements change over time due to changing conditions and needs of the military. A large increase in activity at this range might have an impact that will be assessed as a part of the NEPA process that would be in order for this change.

Species surveys, i.e. birds, small mammals, and furbearers will be completed during the life of this plan. When these surveys have been completed, the effects of operation on these populations will be assessed.

2.2.3 Toandos Peninsula Buffer Zone Military Mission

The military mission of this area is to provide a security buffer for the operations taking place at SUBASE, Bangor.

- **Military Mission Requirements.** The requirements of the Toandos Peninsula is to provide an undeveloped area in which security can maintain the buffer described above. This area is currently being used by the MCSF Co. to provide a training area for various field operations.
- **Natural Resources Needed to Support the Military Mission.** The SUBASE Forester manages this property for forest products. There are four Bald Eagle nests in this area that are afforded protection according to the Bald Eagle management guidelines authored by the USFWS. There have been anadromous fish surveys completed for this area and it is logical that these streams support Summer-run Chum Salmon. None of these listed species will be impacted by the military mission. All participants in training activities will be directed to avoid these areas.
- **Effects of the Natural Resources or their Management on the Mission:** As this area is used as a training site, consumptive use of Fish and Wildlife species will not be affected. Forestry product removal would improve training opportunities as it would open areas for greater maneuverability.
- **Future Military Mission Impacts on Natural Resources.** No changes in mission impacts are anticipated on Toandos.

Species surveys will be completed during the life of this plan. The effects of operations on the recorded species will be assessed.

3.0 Organizational Structure and Partnerships

Commander, Navy Region Northwest is the owner of the properties identified in this INRMP. The SUBASE Bangor Commanding Officer is the delegated authority to operate and maintain SUBASE Bangor, the Annex, Camp Wesley Harris, and Toandos including implementation and enforcement of this INRMP.

The Commanding Officer is dedicated to implementing the plan as required by the Sikes Act and other applicable federal laws. Just as importantly, the Commanding Officer is dedicated to maintaining and improving the military mission at SUBASE Bangor.

3.1 SUBASE Bangor Organization Structure

3.1.1 Commanding Officer

The Commanding Officer is directly responsible for operating and maintaining SUBASE Bangor, the Annex, Camp Wesley Harris, and Toandos. The Commanding officer is personally liable for noncompliance with environmental laws. Thus, the Commanding Officer has a personal interest in assuring that this INRMP is properly implemented.

3.1.2 Executive Officer

The Executive Officer directs the overall management of SUBASE Bangor, the Annex, Camp Wesley Harris, and Toandos. The Executive Officer ensures that installation-wide support is provided for implementation of this plan.

3.1.3 Directorate of Public Works

The Directorate of Public Works is responsible for the management of grounds, roads, training lands, and facilities at SUBASE Bangor, the Annex, Camp Wesley Harris, and Toandos.

3.1.4 Natural Resources Organization, Roles, and Responsibilities

Professionally trained natural resource management staff and natural resources enforcement are required to implement this INRMP. The Sikes Act, Section 670g, defines a “professional” as one who has an undergraduate degree or graduate degree in a natural resource related science. Existing natural resources management staff, Environmental Resources Division staff, and contracted personnel will be required to implement this plan. The Sikes Act also states that if an installation cannot retain a professional natural resources staff, related federal and/or state agencies be given the opportunity to assume these tasks. Existing natural resources management staff includes:

- Forester/Environmental Protection Specialist
- Wildlife Biologist
- Game Warden/Park Technician
- Engineering Technician

Forest management is the primary responsibility of the Forester/Environmental Protection Specialist, with collaborative assistance in planning and design of management activities by the Wildlife Biologist.

Wildlife Management is the primary responsibility of the Wildlife Biologist, with collaborative support by the Game Warden/Park Technician, the Engineering Technician and the Forester/Environmental Protection Specialist.

Water supply issues are the primary responsibility of the Forester/Environmental Protection Specialist, with collaborative support from the Engineering Technician.

Cultural resource protection is the primary responsibility of the Forester/Environmental Protection Specialist, with field assistance from the Game Warden /Park Technician.

Fishing and Hunting Laws and Regulation Enforcement is the primary responsibility of the Game Warden/Park Technician.

The Construction Battalion Unit 418 (CBU), Self Help, and Morale, Welfare and Recreation (MWR) organizations will assist within their areas for implementation of the plan.

3.1.5 Other Defense Organizations

Other Defense organizations may assist in implementation of the INRMP. The Army Corps of Engineers, stationed at Fort Lewis, periodically support the SUBASE Bangor mission through

project implementation. Whidbey Island Naval Air Station reconnaissance planes have assisted SUBASE Bangor with aerial photo reconnaissance for use in Natural Resource planning. Engineering Field Activity Northwest supports SUBASE natural resource management with funding management and with technical assistance from biologist and forester personnel.

3.1.6 Other Federal Agencies

The U. S. Forest Service has ties to the Bangor Natural Resource program in several areas. The Olympic National Forest assisted with the writing of the INRMP. There has been seed collected from western white pine on SUBASE Bangor, which has been analyzed for genetic resistance to the white pine blister rust disease at the Forest Service Dorena Nursery in the tree improvement program. Also some of the scion from the Navy white pine have been grafted onto rootstock at the Denny Ahl seed orchard on the Olympic National Forest for testing and seed production.

The U.S. Fish and Wildlife Service (USFWS) is a regulatory agency who also is a member of the SUBASE Bangor Cooperative Agreement. They are concerned as to how plans and activities may or may not affect sensitive, threatened, or endangered species. The U.S. Fish and Wildlife Service, and the National Marine Fisheries Service are signatory agencies in the implementation of this plan, as required by the Sikes Act. USFWS has surveyed wetlands on SUBASE Bangor.

3.1.7 State Agencies

The Washington State Department of Fish and Wildlife (WDFW) is working on SUBASE Bangor to evaluate the Devils Hole stream system. The WDFW is a cooperator in wildlife studies on INRMP lands. The WDFW is a regulatory agency who also is a member of the SUBASE Bangor Cooperative Agreement. They are responsible and have approval for activities impacting fish and wildlife on SUBASE Bangor. In this capacity they issue Hydraulic Project Approvals for waterfront and stream side projects proposed by the Navy. The WDFW is also a signatory agency in the implementation of this plan, as required by the Sikes Act.

The Washington State Historic Preservation Office (SHPO) is consulted regarding the effects of activities on the installation's cultural and historical resources.

3.1.8 Universities

The University of Washington and Washington State University are collaborators with Navy natural resources personnel. They are consulted on natural resource problems, and have done studies in cooperation with Navy Natural Resource Managers. Equipment has been shared to carry out projects. Current projects with the University of Washington include a study to determine the population levels of bear. This includes the capture of bear and taking blood, hair and scat samples. A study with is being conducted with Washington State University to determine causes and treatments of a "black-tailed deer hair loss syndrome" which has killed a number of deer in Western Washington.

3.1.9 Contractors

The Base Operations Service Contractor, at this time operated by Johnson Controls World Services, is the primary base contractor for services such as security, maintenance, and the operation of facilities. They are also available to do other natural resource design and

construction as needed. There are other independent contractors which are present and working on special contracts.

Timber Purchaser contractors have varied in size from the largest forest products companies to small local family owned and operated logging companies.

3.1.10 Other Stakeholders

The Point No Point Treaty Council is a coalition of local Native American tribes that had use of this area prior to European habitation. They have treaty rights, which includes uses of resources on SUBASE Bangor. Another local tribe, the Suquamish, is also consulted.

The Hood Canal Coordinating Council (HCCC) is a coalition of County and Tribal governments concerned about maintaining and restoring water and other natural resources of Hood Canal. This council prioritizes projects and coordinates efforts to obtain funding and resources to maintain clean water, and support and protect the fishery resource within the Hood Canal region. HCCC is currently the state lead organization for Hood Canal Summer Chum salmon recovery under the Endangered Species Act.

The Hood Canal Environmental Council is an environmental group that is concerned with natural resource management within this area.

The Audubon Society is an environmental organization. They are concerned with management activities that can affect the habitat of local flora and fauna. They have been involved with surveys and annual counts for bird species on the base.

The local West Sound Technical Skills Center provides high school age students for natural resource work on the Navy base as a means to provide a vocational experience to the students. This has included tree planting and young stand thinning.

SUBASE Bangor will attempt to develop more partnerships with neighbors and organizations interested in managing ecosystems that extend beyond installation boundaries. This can have benefits to the environment of developing watershed based planning rather than scattered improvements in smaller areas. This can give greater benefits from the efforts expended. While this ecosystem management approach has the potential to improve natural resources management, it also may create biopolitical issues.

It will be fairly easy for SUBASE Bangor to form partnerships with natural resources based state, federal, and tribal agencies. These organizations understand the mutually beneficial aspects of such partnerships. There are some organizations within the local and state communities with environmental concerns, such as the Hood Canal Coordinating Council and the Kitsap County chapter of The Audubon Society. These organizations are likely contacts for community partnerships beyond installation boundaries.

There are regional recovery efforts under the Endangered Species Act to assist in recovery of habitat and populations of the Hood Canal Summer Chum and the Puget Sound Chinook salmon.

The National Marine Fisheries Service listed these species as Threatened in March 1999. The Navy will be part of these recovery efforts.

A Cooperative Agreement signed in 1997 with the Point No Point Treaty Council (Skokomish, Port Gamble S'Klallam, Lower Elwha S'Klallam, and Jamestown S'Klallam) assigns the tidal beach from KB Dock to Delta Pier to the Tribes for enhancement, perpetuation, and harvest of shellfish.

Traditional harvest of cedar inner bark by Suquamish tribal members for use in baskets and traditional dance costumes has been a cooperative project. The Tribe obtains the bark, and SUBASE receives the benefit of a greater number of wildlife trees.

The Hood Canal Coordinating Council, of which SUBASE is an ex-officio member, is composed of representatives of the three counties and two tribes bordering on Hood Canal. The purpose of HCCC is to coordinate inter-governmental planning to protect water quality and related natural resources in the Hood Canal watershed through a strong education program.

It is the policy of the Department of Defense as well as the Navy, to increase partnerships with qualified organizations wherever possible. It is the intention of this plan to strengthen existing partnerships, build new ones, and encourage cooperation with outside groups to accomplish the following:

- Encourage a free exchange of ideas in order to take the benefit of the latest technology.
- Encourage the access by private groups in order to facilitate this exchange.

4.0 Land Use Management

Land management is an encompassing term that can apply to all management activities that involve the physical alteration or maintenance of lands. Activities such as lake-stocking and silviculture harvests could possibly come under the title. However, in order to discriminate the function of these activities, management of most programs is classified by the natural resources involved. Those program areas that primarily involve the land itself or soil and other mining resources will be covered in this chapter. Programs such as soil conservation, erosion control, grounds maintenance, wetlands protection, and land use coordination are included. Land management also pertains to those activities that support the facilities of the military resource with SUBASE Bangor, the Annex, Camp Wesley Harris and Toandos.

The purpose of proper land management is to maintain facility grounds in a manner that preserves the integrity of the military mission while protecting real estate, human health and environmental quality. Because land management deals with the entire land base of SUBASE Bangor, the Annex, Camp Wesley Harris and the Toandos Peninsula Buffer Zone, it is from this perspective that all other management goals, objectives, and activities must be compared and contrasted. Hence, integration of natural resources management plan starts here.

Within the boundaries of SUBASE Bangor, Camp Wesley Harris, and the Toandos Buffer Zone, there is no private ownership. The beaches at the Toandos Buffer Zone are owned by the State

of Washington and managed by the Department of Natural Resources for recreational shellfish harvest. SUBASE Bangor has oversight of all the land within this plan

4.1 Applicable Federal Laws, Regulations and Policies

Table 2

<i>Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), as amended, 7 USC 121 and 136 et seq.</i>	The application of this act provides the principal means for preventing environmental pollution due to the use of pesticides. Pollution prevention is accomplished through product registration and applicator certification. The registration of all pesticides by EPA results in instructions on each container for use, storage, and disposal.
<i>Federal Noxious Weed Control Act, as amended, 7 USC 2801 et seq.</i>	Establishes control and eradication of noxious weeds and regulates them, and authorizes agents to control noxious weeds at landowner expense.
<i>Soil Conservation Act, 16 USC 590 (a) et seq.</i>	This act provides for the application of soil conservation practices on Federal lands.
<i>Soil and Water Conservation Act of 1977, 16 USC 2001 et seq.</i>	This act establishes a program for conservation of soil and water resources by state and federal agencies. It calls for investigation and analysis of the feasibility of collecting organic waste materials (e.g. digested sewage sludge) and applying these materials to the land to improve soil tilth and fertility.
<i>Rivers and Harbors Act, 33 USC 401 et seq.</i>	This act requires consultation and permitting from the Army Corps of Engineers for any construction activities in navigable waterways of the US.
<i>Marine Resources and Engineering Development Act of 1966, as amended, 33 USC 1101 et seq.</i>	This act establishes a national policy for the management, beneficial use, protection and development of the land and water resources of the coastal zones.

Table 2 (continued)

<i>Federal Water Pollution Control Act (Clean Water Act), as amended, 33 USC 1251 et seq.</i>	This act is the first major Federal legislation that regulates activities involving the Nation's water resources. Section 319 requires Federal agency consistency with State non-point source pollution abatement programs. Section 401 requires state-administered water quality certification for projects that affect water quality, including wetland disturbance. Section 404 regulates discharges in navigable waters and wetlands and is administered by the Army Corps of Engineers. The Navy is to comply with the national goal of no net loss of wetlands, and is to avoid loss of size, function and value of wetlands.
<i>Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 USC 9601 et. seq.</i>	Natural resource trustees evaluate proposed remedial action for impact to natural and cultural resources, prepare ecological risk assessments, and serve as members of the RABs.

4.2 Goals and Objectives

The goals of land use management at SUBASE Bangor, the Annex, Camp Wesley Harris and the Toandos Peninsula Buffer Zone are:

- Effectively and economically maintain the grounds of SUBASE Bangor, the Annex and Camp Wesley Harris in an environmentally safe and sensitive manner that compliments the military mission while protecting the real estate and human health.
- Multiple land uses are compatible to the greatest extent possible.
- Applied land management practices are consistent with the ecosystem management approach;
- Make available the lands for non-military productive uses.

In order to meet these goals, the following objectives are established:

- Design management practices to require minimum resources for optimal results;
- Incorporate best management practices into the land management program;
- Maintain no net loss of wetlands;
- Reclaim human altered barren/marginal lands into productive natural resources;
- Improve surface water quality;
- Reduce grounds maintenance costs through the application of innovative management techniques;
- Maintain aesthetically pleasing appearance for personnel and visitors;
- Ensure the Natural Resource Branch is aware of activities of other programs that may impact lands or land uses.
- Decrease incompatible land use annually;
- Protect from development natural areas with a high degree of ecosystem integrity over those of less integrity.

4.3 Existing Land Use/Land Cover

SUBASE is divided generally into two major land-use sectors. The northern sector (Lower Base) includes about three-fourths of the land area of the site and contains most of the industrial facilities. This area includes the waterfront operations area, ship and weapons systems, maintenance and production facilities, and the magazines. Those industrial facilities where explosives are handled have been assigned an explosives rating and a corresponding "Explosive

Safety Quantity-Distance” (ESQD) arc. Activities within arcs from each facility are limited to those activities directly related to the facility. Explosive safety is a primary factor influencing the location of facilities. The operations area consists almost entirely of the wharves and docking facilities distributed along the four-mile shoreline of the SUBASE. These include the Explosives Handling Wharf, Delta Pier, Marginal Wharf, and the Magnetic Silencing Facility. ESQD Arcs encumber the entire waterfront with the exception of the Service Pier.

The southern portion (Upper Base) of the base land use includes administrative offices, public works industrial activities, housing areas, the core area (shops, restaurants, indoor recreation, etc.), and other support facilities. These uses are grouped in relatively compact clusters to facilitate pedestrian circulation. The Upper Base supports 1,319 units of family housing, plus 696 suites of Bachelor Enlisted Quarters.

The INRMP is to implement an ecosystem based conservation program that provides for conservation and rehabilitation of natural resources in a manner that is consistent with the military mission; integrates and coordinates all natural resources management activities; provides for sustainable multipurpose uses of natural resources; and provides for public access for use of natural resources subject to safety and military security considerations. The management objectives are to integrate forestry management, fish and wildlife management, land management and management for outdoor recreational opportunities, as practicable, and consistent with the military mission and established land uses.

Note, I deleted the paragraph that was here, as it didn't make any sense.

4.3.1 Grasslands and Shrublands

SUBASE Bangor contains many diverse grassland habitats. Some of these areas were left as remnants of pasture and orchard operations by inhabitants prior to the Navy's purchase of the property in the 1940s. Other grassland areas were created as a result of mitigation measures taken in accordance with the Installation Restoration Program. This program is tasked with cleaning up and mitigating past hazardous waste sites. In areas where the mitigation involved was very intrusive, the area was graded and planted with native grass and clover species. One area received soils that had been removed and cleaned via the composting process. These soils, highly enriched with fecal fertilizer and vegetable additives, were planted with native grass species. These grasslands occur in outlying, non-industrial areas and are only mechanically treated for the removal of Scots Broom.

4.3.2 Woodlands and Forests

A forest is defined as a biological community dominated by trees and other woody plants. Forested areas comprise 3,754 acres of SUBASE Bangor, 668 acres of the Annex, 358 acres of Camp Wesley Harris, and 723 acres of Toandos. Most of the forests within the managed lands of SUBASE Bangor are in the western hemlock/salal plant association groups (Henderson et al 1989). Red alder often dominates early seral stages in this association. Douglas-fir, a long-lived seral species, is common. Western hemlock and western red cedar will dominate the climax stage of succession.

Present SUBASE forests are comprised of both evergreen and deciduous forest stands. The evergreen stands (about 4,000 acres) are common on the drier soils and are predominately Douglas-fir with western hemlock, western white pine, western red cedar, lodgepole pine, and

grand fir. The deciduous stands (about 1,500 acres) are usually found on the wetter soils and are predominately red alder with big leaf maple. Understory vegetation varies from salal on the drier soils to sword fern and salmon berry on the wetter soils. Other common understory species are hemlock and cedar seedlings, rhododendron and huckleberry.

The forest stands are in a variety of hypothetical stages of forest ecosystem development (Appendix 5, Acronyms & Definitions) (Carey et al, 1995). There are some younger plantations in the “Ecosystem Initiation Stage” which are just getting started. Some stands are very dense and are in the “Canopy Exclusion Stage” with little or no understory component, and some have been commercially thinned where light can enter the stand again and have moved on to the “Understory Reinitiation Stage”. There are a few older unmanaged stands in the Toandos Buffer Zone that have possibly developed into the “Fully Functional Stage” which approaches “Old Growth” conditions. The patterns of vegetation are the result of natural and human disturbance. The primary disturbance to vegetation has been timber harvesting. Additional disturbances can include fire, insects and disease, windthrow, non-native invasive plant species, and are impacted by deer, mountain beaver, and black bears.

4.3.3 Land Cover on Managed Lands

SUBASE Bangor

The largest land cover type at SUBASE Bangor and the Annex is forest land (3,754 acres) followed by developed land (1,500 acres). Together they represent 85% of SUBASE Bangor land area. The remaining lands include surface water, wetlands, and disturbed lands.

Table 4. SUBASE Bangor Land Cover

Description	Acreage	% of Land Use
Developed Land	1,500	24
Forest land	3,754	61
Surface Water	54	1
Wetlands	254	4
Disturbed Lands	593	10
Total	6,130	100

The Annex

The largest land cover type at the Annex is forest land (668 acres) followed by developed land. Together they represent 80% of the Annex land area. The remaining lands include wetlands and disturbed lands.

Table 5. The Annex Land Cover

Description	Acreage	% of Land Use
Developed Land	301	28
Forest land	668	62
Surface Water	0	0
Wetlands	3	0
Disturbed Lands	100	10
Total	1,072	100

Camp Wesley Harris

The largest land cover type at Camp Wesley Harris is forest land followed by wetlands. Together they represent 98% of the Camp Wesley Harris land area. The remaining lands include developed, surface water, and disturbed lands.

Table 6. Camp Wesley Harris Land Cover

Description	Acreage	% of Land Use
Developed Land	3	1
Forest Land	358	92
Surface Water	.2	0
Wetlands	22	6
Disturbed Lands	5	1
Total	388	100

Toandos

The largest land cover type at the Toandos Peninsula Buffer Zone is forest land followed by developed land (primarily roads).

Table 7. Toandos Land Cover

Description	Acreage	% of Land Use
Developed Land	37	5
Forest land	723	94
Surface Water	0	0
Wetlands (Est.)	8	1
Disturbed Lands	0	0
Total	768	100

4.3.4 Land Use Suitability and Limitations

Land development at SUBASE Bangor is likely to continue in the future, beyond the recently completed pulse of development which occurred as a result of the Base Realignment and Closures (BRAC) and relocated operations here from other installations. In light of the development goals and the ability of the land to support those goals, land development will likely be carried out. A thorough assessment of the environmental and regulatory restrictions and limitations must be completed for each land development project. Therefore, the beginning of the development planning stage is the critical point where all limitations and suitabilities must be established.

Continued use of NEPA-required environmental assessment and environmental impact statements, as well as ESA required Biological assessments will accompany the development process as an aid for review of major projects. To accomplish this, the SUBASE Bangor Natural Resources Branch should be informed of proposed projects at the earliest planning stages so that it may be an integral part of the decision-making process. Reconstruction, renovation and rehabilitation of obsolete facilities should be opted for over new construction when feasible. Development should be focused on the disturbed grounds and military use areas where intensive

development already exists. New land development should focus on improved grounds that are adjacent to other development areas. Semi-improved grounds are the next land types to review. Natural areas should be the last lands reviewed for development. Development within prime forest areas will be discouraged to the extent possible without compromising the military mission.

4.4 Management History

Land use management at SUBASE Bangor has changed substantially over the years as the focus of public land management has changed from product development and sales to ecosystem protection. Land management is now being viewed as an integral portion of the entire resource management objective.

4.4.1 SUBASE Bangor and Annex Historical Development

On November 29, 1973, Congress formally approved the TRIDENT program and an Environmental Impact Statement was begun at the Bangor Location. The Draft EIS was filed with the Council on Environmental Quality on March 21, 1974, and the final EIS was published in July 1974. Supplemental EIS's were published in 1976 and 1977. SUBASE Bangor was commissioned on February 1, 1977.

NTS Keyport retained control over a 1072-acre parcel and facilities located along the eastern edge of SUBASE Bangor and a service craft pier on Hood Canal. They continued to operate these facilities as an ordnance annex throughout construction of the TRIDENT support facilities. NTS Keyport was redesignated Naval Undersea Warfare Engineering Station (NUWES), in 1978. In 1994, NUWES was redesignated Naval Undersea Warfare Center (NUWC). SUBASE Bangor became responsible for natural resources management of the Annex land in October 1998.

Prior to being commissioned as a submarine base, SUBASE Bangor was formerly known as the US Naval Magazine Facility and the Naval Ammunition Depot. On June 4, 1944, the US Naval Magazine, Bangor was officially established as a Pacific Coast transshipment point for ammunition and explosives. With the exigencies of war, Bangor Naval Magazine began operation on January 25, 1945. Several changes in status occurred from the time the base was established in 1945 until it was commissioned as a TRIDENT base in 1977. When World War II ended, Bangor became available for storage of ordnance.

In 1950, the Naval Magazine Facility was consolidated with the Naval Torpedo Station, Keyport to form the Naval Ordnance Depot, (NAD) Keyport. In 1952, it returned to independent status and became the US Naval Ammunition Depot, Bangor. In 1963, Bangor also became a Polaris Missile Storage point with the Polaris Missile Facility, Pacific acting as the tenant of NAD Bangor. During the late 1960s, conventional weapons used in the Vietnam War loaded ships from the Bangor Marginal Wharf. Bangor was responsible for about a third of all weapons sent to Vietnam from 1965 to 1970. No munitions were shipped from Bangor from 1970 until early 1972. With the advent of increased effort in Vietnam, Bangor returned to active status. The last shipment to Vietnam was loaded in January 1973.

The major commands that are located at SUBASE Bangor to support and maintain the TRIDENT system are Navy Region Northwest (NAVREGNW), Submarine Group Nine (SUBGRU NINE), Submarine Squadron Seventeen (SUBRON SEVENTEEN), Submarine Development Squadron Five (SUBDEVRON FIVE) Detachments, Naval Submarine Base (SUBASE) Bangor; Intermediate Maintenance Facility Pacific Northwest (IMFACPAC), Bangor (formerly TRIDENT Refit Facility (TRIREFAC) Bangor); TRIDENT Training Facility (TRITRAFAC) Bangor; Strategic Weapons Facility (SWFPAC) Pacific; Naval Undersea Warfare Center Detachment, Keyport Annex; Marine Corps Security Force Company (MCSFCo) Bangor; and Naval Computer and Telecommunication Station (NAVCOMMTELSTA) Puget Sound.

4.4.2 Camp Wesley Harris Historical Development

In 1940, Camp Wesley Harris was established as a training facility for US Marine Corps (USMC) personnel. The facility is named after Private Wesley Ernest Harris, who was the first US Marine killed during WW I in Saint Mihiel, France on September 16, 1918. The facility was originally under the cognizance of the Puget Sound Naval Shipyard and was transferred to SUBASE Bangor on September 19, 1979. Camp Wesley Harris continues to be used as a military training facility.

4.4.3 Toandos Peninsula Security Buffer Zone Historical Development

On 5 June 1944, land on Hood Canal including land on the Toandos Peninsula was selected and purchased by the Navy for construction of the U.S. Naval Magazine, Bangor. The activity was commissioned in August 1945, as the U.S. Naval Magazine Facility and in 1947 was designated the U.S. Naval Ammunition Depot (NAD), Bangor. In fiscal year 1999, after the Northwest Naval Facilities regionalized to improve efficient management and combine resources, the natural resources management responsibility for the Toandos Buffer Zone were assigned to SUBASE.

4.5 *Proposed Land Uses and Management Measures*

4.5.1 Recommended Land Uses

As mentioned above, the land use demands at SUBASE Bangor will continue into the future. The undeveloped portions of the properties will be under increased development pressure as time goes on. One objective of the Natural Resources Manager should be to help direct development toward the less environmentally sensitive areas. Then, the most acceptable areas for development, from an environmental standpoint, must be established.

4.5.2 Shoreline Erosion

Naturally occurring erosion is occurring along the steep banks of Hood Canal. The Natural Resource Manager should monitor the stabilization and condition of existing erosion control structures to ensure they are functioning properly. Erosion problems should be documented as they occur. Also, investigate and develop solutions for known, existing problems on Hood Canal, Cattail Lake and Devils Hole Lake. There is currently a contract between the Navy and WDFW to evaluate and minimize erosion in Devils Hole watershed. This study will provide SUBASE the following information:

- Provide an assessment of the existing wild salmon production.

- Provide an estimate of the stream system's fish production potential.
- Provide recommendations of corrective actions to be taken in order to achieve system potential for native salmonid production.

Shoreline protection proposals will be assessed for significant resource problems as they occur. To accomplish this, the Natural Resources Manager will utilize the expertise and resources of partner agencies such as the US Geological Survey, Washington State Department of Fish and Wildlife, and National Marine Fisheries Service. Silt and runoff associated with erosion can be problems in certain areas of the base. Where problem areas are identified, mitigation projects will be instigated to minimize erosion and correct problems

Toandos Peninsula has terrain that contains deep canyons, steep slopes, and high banks. This property has been determined to be non-buildable. The present use of this land is as a training area for the MCSF Co. and as a Security Buffer for SUBASE Bangor. Logging has taken place in the past and will continue to take place with proper considerations and precautions taken in regards to the four Bald Eagle nests and the streams containing chum salmon. Logging operations will proceed with the knowledge of this area's high erosive potential and care will be taken to limit cuts to thinning and salvage in order to insure that no large areas of bare ground will be created.

4.5.3 Interior Land Erosion

The greatest potential for soil erosion occurs around stream systems and in locations where the landscape has steep slopes and sandy soils. These conditions are prevalent along the western portion of SUBASE Bangor along the Devils Hole Lake Drainage and Cattail Lake Drainage. Field inspection of stream corridors by Natural Resources personnel disclosed some severe stormwater erosion gullies leading into the stream corridors. This has resulted in severe sedimentation of the stream channels and sloughing of the stream corridor slopes.

The Natural Resources staff, with the assistance of partner agencies, will conduct a specific survey of the INRMP managed interior lands to identify erosion control problems. During the survey, recorded information on each problem will include location, scope of the erosion, severity of the problem, and cause of the erosion. The list of problem areas will then be prioritized for restoration using a three-tiered approach.

- Tier 1 problems would include severe erosion areas that pose a hazardous condition to human health or an ecosystem;
- Tier 2, severe erosion problems that do not pose an immediate hazard; and
- Tier 3, minor erosion problems.

Upon completion of the survey, prioritized items in the erosion control plan will be budgeted and programmed for implementation. The appropriate remedial practices will be identified for each erosion problem area.

4.6 Fire Management

4.6.1 Prescribed Burning

Prescribed burning is not planned as a management tool.

4.6.2 Fire Prevention and Suppression

There are numerous roads, railroads, streams, and other wet areas which act as firebreaks, giving the installation an extensive fire break system. Weeds and brush along the sides of the roads is sprayed or mowed which helps maintain the efficiency of the fuel break. Changes to this system are not planned during the next five-year period.

SUBASE has two full time manned fire stations. Outlying areas would receive assistance from local State and Fire Protection District crews in the event of wild fire.

4.7 Storm Water Management

Proper storm water management is important to the aquatic resources and water quality of the lakes and streams of SUBASE Bangor, the Annex, Camp Wesley Harris and the Toandos Peninsula Buffer Zone as well as Hood Canal. Storm water management starts with a description of the watersheds and expected flow rates from rainfall events.

Soils formed from glacial outwash materials, the Indianola, Neilton and Ragnar map units, are excessively drained. Their gravelly, sandy textures are rapidly permeable by water, giving them a high potential to impact groundwater.

Storm water runoff from impervious surfaces has a high potential to carry pollutants into groundwater. On SUBASE Bangor, these surfaces total 439 acres, concentrated on the south end of the base. Impervious surfaces on the base include: streets and sidewalks (258 acres), parking lots and other paved areas (67 acres), and buildings (114 acres). SUBASE Bangor will use existing plans to protect from storm water pollution. There is a Storm Water Pollution Prevention Plan, a Well Head Protection Plan, and a Spill Prevention and Control and Countermeasure Plan.

SUBASE Bangor and the Annex have a storm water management pollution prevention plan which describes the watersheds and is in compliance with the EPA National Pollution Prevention Permit Number, WAR05A01F. Camp Wesley Harris and the Toandos Peninsula Buffer Zone are not covered under a NPDES permit.

The Natural Resources Manager, in consultation with the Storm water Manager, will evaluate the feasibility of implementing a storm water plan at Camp Wesley Harris and the Toandos Peninsula. The Natural Resources Manager will promote the use of storm water management facilities design criteria which produce wetland characteristics and other biological benefits. Implementation of sound storm water management practices on new construction sites at SUBASE Bangor, the Annex, and Camp Wesley Harris will be required as normal course of business. Improper and inadequate storm water treatment is one of the greatest impacts to surface water quality and the degradation of aquatic habitats on the installations (excluding the Annex). The Natural Resources Manager will continue to examine the use of fertilizers and pesticides in grounds maintenance practices and reduce application as needed to maintain and improve water quality. Revegetation and structure development, such as water bars, and grassy swails can slow water runoff and reduce erosion and sedimentation. Maintenance of ditchlines of roads and culverts can prevent major road damage and the resulting sedimentation. All construction contracts on SUBASE Bangor will include provisions for adequate erosion control,

sediment control, and site restoration. Immediate vegetative restoration of disturbed construction sites and the survival of vegetative cover for at least one year is a requirement of construction contracts.

Erosion can be controlled with structures to remove water to non-erosive areas and then vegetated for long term erosion control.

4.8 Landscaping/Grounds Maintenance Specifications

The Federal government controls a great deal of real estate, much of which requires some form of grounds maintenance. Thus it is presented with a unique opportunity to take the lead in the area of landscaping by developing practical and cost-effective methods to preserve and protect these lands. In April 1994, the President issued a Memorandum for the Heads of Executive Departments and Agencies, Subject: Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds. This document requires Federal agencies to employ landscaping technologies and practices that serve to conserve water and pollution prevention.

A great deal of time, effort, and money are expended each year to maintain the SUBASE Bangor, the Annex, and Camp Wesley Harris grounds. This work is contracted through a Base Operating Services Contract administered by Engineering Field Activity, Northwest (EFANW). The portion of the contract covers landscaping and grounds maintenance including planting, seeding, mowing, pruning, trimming, clipping, chemical application, erosion control, and maintenance of the machines and tools of operation. Therefore, it is prudent to review the grounds maintenance specifications employed and the possibility of reducing the amount of area requiring intensive maintenance.

4.8.1 Mowing Reduction

In the past, many large tracts of previously mowed turf grass on Upper Base were planted with trees, shrubs or other wildlife cover to reduce the area of mowed grounds. Areas that are now under lawn should be re-evaluated for another reduced mowing schedule. The immediate areas around buildings and other facilities need to remain well groomed for fire safety, building maintenance and pest control as well as aesthetics. Many times, mowing only twice a year will maintain an herbaceous edge and prevent growth of woody vegetation. This woody vegetation can be destructive to pavement and, therefore, must be controlled. One of the drawbacks to mowing reduction is the probable increase in the rodent population, and thus the increased possibility of acting as vectors for the Hantavirus and other such maladies. Therefore, mowing reduction should not be utilized without appropriate pest control measures in areas that are heavily utilized by personnel. Mulching down trees and utilizing the resulting chips to maintain soil moisture will be explored and put into place where applicable.

4.8.2 Housing and Support Area Management

This installation acknowledges its responsibilities as listed in the White House Memorandum, Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds (Office of the President 26 April 1994). The memorandum's requirements include:

- using regionally native plants for landscaping;
- using construction practices that minimize adverse effects on the natural habitat;

- reduce pollution by reducing the use of fertilizer and pesticides, using integrated pest management, recycling green waste, and minimizing runoff;
- implementing water-efficient practices; and
- creating demonstrations of these practices to promote their use elsewhere.

Because of the nature of the housing and support area, there are many open areas with buildings and roads mixed with forest land. This creates a lot of habitat with a forest edge effect. Some species of wildlife and birds, which use early-seral habitat, find this very attractive. These species have flourished. SUBASE Bangor residents and employees have become accustomed to seeing these species. The viewing enjoyment has led to artificially feeding some of these animals, such as raccoons and squirrels to the point that some of them have become pests and have damaged private property. It is the policy of the natural resources program to discourage feeding of any wild animals. This policy will be provided the public via special notices to housing residents, articles on this subject in the Trident Tides, and as a topic for the presentation given to new residents at their indoctrination.

Maintenance costs have been reduced over the years by converting some mowed grassland to forest. Another maintenance savings has been accomplished through scarification of brush and young trees under power lines and planting to grass/shrub mixtures that are heavily browsed by wildlife, and need mowing or cutting less often.

4.8.3 Review of Planting and Maintenance Specifications

Planting and maintenance specifications were developed for the Base Operations Security Contract (BOSC). There are standard operating procedures for mowing, planting, seeding, fertilizing, pruning, and erosion control methods to be used on SUBASE Bangor, the Annex and Camp Wesley Harris. These specifications will be reviewed by the Natural Resources Manager and revised, if necessary.

Grass/short perennial communities are promoted in high voltage line right of ways. We will continue with mowing reduction efforts by converting lawns to other vegetative cover that requires reduced or no maintenance. Natural resources managers will continue to review landscaping plans for appropriateness of plant materials, methods (mulch) and locations. Encouraged uses will include regionally native plants, taking full advantage of the expertise provided by the Tribes and both the Washington State Department of Natural Resources and WDFW, encouraged use of low-maintenance input landscaping techniques to reduce both water consumption and the necessity for intensive chemical applications. The BOSC contract will be reviewed for consistency with INRMP objectives. We will continue employing best management practices in landscaping and grounds maintenance activities.

4.9 Pest Management

Pest control work is conducted through the BOSC and is administered by Engineering Field Activity, Northwest (EFANW) and Public Works. Some pest control activities involving vertebrate wildlife species are discussed in the Wildlife Management chapter.

4.9.1 Integrated Pest Management

SUBASE has an Integrated Pest Management Plan (IPMP) completed in 1998, which is coordinated by the Pest Control Coordinator located in the Utilities Division. The plan calls for non-chemical methods to be utilized first. It's only when these methods are inadequate, that chemicals are used. The plan calls for use of approved pesticides only. Natural resources management personnel have monitored chemical pesticide uses, and have suggested some modifications to earlier practices that have reduced threats to the environment. The approved IPMP is monitored by a Navy certified Pest Control Coordinator, and requires pesticide application by state licensed applicators. Road shoulders and railroad right-of-ways are periodically sprayed for brush control. The ditch line of roads is periodically mowed to control brush species and this helps minimize the use of herbicides.

Scot's broom is a problem and will need to have continual removal efforts. Non-chemical pest management used in natural resources management includes slashing of non-native Scots broom and other low value or competing vegetation to make way for high value native browse plants, pre-commercial thinning in young forest stands, nesting exclusion to control pest birds, and trapping to control Canada geese.

Pesticides that could be used in natural resources management include vegetation control herbicides for forestry and wildlife forage management, chemical attractants for trapping of harmful insects, insecticides for control of insect pests in forestry or wildlife management, and egg addling to control Canada geese.

Canada geese are considered a pest on SUBASE Bangor. The number of geese nesting in the Main Limited Area (MLA) has grown tremendously over the years. They colonize grassy areas and set off security area sensors. Various ways of elimination and dispersal have been used, such as egg addling and euthanasia. The Wildlife biologist, with a permit issued by USFW, began a process where all eggs in nests are addled using Mazola Corn Oil. This process stops the eggs from hatching but the geese remain on the eggs, which keeps them from laying another clutch. In 1998, nearly 500 geese were euthanized with cooperation and concurrence of USFW and the USDA Wildlife Services.

Tansy Ragwort is a noxious weed. This is considered under control and not a serious problem because of natural control offered by the Cinnabar Moth.

Control of cats and dogs within the housing area and on the base are the responsibility of Kitsap County Humane Society.

Integrated pest management is a comprehensive approach to pest management or prevention that considers various chemical, physical, and biological suppression techniques, the habits of the pest, and the environment. It emphasizes preventive pest control measures in lieu of corrective measures wherever cost effective. Integrated pest management is based on the principals that control is only required if a population will surpass a threshold which inhibits a military mission, safety, or aesthetic quality.

The Integrated Pest Management Plan is a component of land management. The Integrated Pest Management Plan will be reviewed and updated as a means to strive for continued and improved application of methodologies. The pest control portion of the BOS Contract will be reviewed to determine consistency with the INRMP objectives.

The Scot's broom needs to be removed and replaced with soil-building species. This will be included in the list of projects each year until they are eradicated. These replacement species can be legumes or alder. Red alder grows quickly, adds available nitrogen and organic matter to the soil, and is becoming more valuable as a forest product used in the manufacture of furniture.

4.10 Urban Forestry Management

The primary goal of the utilization of urban forest resource within SUBASE Bangor and the Annex is to locate and remedy hazardous conditions (danger tree locations), develop guidelines for efficient maintenance and improve forest composition.

The urban management plan will list management descriptions of the trees that occur in the urban landscape at SUBASE Bangor and the Annex and describe their conditions. This is a low priority.

4.11 Water Quality

4.11.1 Lakes and Ponds

SUBASE has four lakes, a small kiddie pond, and four large marshes within its boundaries. The primary function of these water bodies is to provide storm water control, provide quality outdoor recreation opportunities, and to provide unique habitat populated by species that enhance the aesthetic qualities that make SUBASE unique.

Devils Hole

Devils Hole is a 15 surface acre lake fed by a watershed area of approximately 3.0 square miles. There are approximately 3.5 miles of streams that feed into this lake.

Devils Hole was created in the late 1940's when the Navy modified a road. A water level control structure on the culvert draining Devils Hole Creek created the lake and it effectively blocked the flow of these streams into Hood Canal.

A fish ladder allows Devils Hole watershed to support an anadromous fish population consisting of Coho salmon, Chinook salmon, steelhead, and sea-run cutthroat trout. The lake itself offers the opportunity to sports fishermen to catch released rainbow trout as well as the native species previously mentioned.

The lake also provides habitat for such unique fauna such as: black bear, otter, beaver, Canada goose, American widgeon, mallard ducks, and great blue heron.

Devils hole had a fish ladder installed in 1981 at the outlet to Hood Canal. This afforded SUBASE the opportunity to attempt to reintroduce Coho salmon into this water shed. We raised approximately 800,00 salmon from eggs and released the fry into the stream system that feeds

this lake. The program was stopped in 1991 and we continued to have returns until the catastrophic winters of 1993, 1994. These winter storm events caused a silting in of the spawning habitat and the returns of “wild” fish diminished substantially. We are currently working with the Washington Department of Fish and Wildlife to design a fix for this problem and reestablish productive habitat within this water shed.

Cattail Lake

This lake was also created in the same way as Devils Hole. The streams that feed this lake were blocked from directly entering Hood Canal when the Navy built a security road across these streams. The lake has a surface area of approximately 10 acres and drains a watershed of about 4.5 square miles. This area is a popular recreation area as it affords folks with the opportunity to hike, fish, and to view wildlife in a natural setting.

The lake contains released rainbow trout, released German brown trout, and native cutthroat trout. It is also home to an active osprey nest and offers habitat for river otter, raccoon, beaver, mallard ducks, American widgeon, Canada geese, cormorants, Mergansers, and Great Blue Herons.

The cutthroat trout population is unique as it was derived from the entrapped sea run population left behind after the road was built. There is strong evidence that both rainbow and cutthroat utilize the feeder streams for spawning. The cutthroats have been looked at by WDFW as a possible clean genetic source for hatchery production of sea-run cutthroat.

Trident Lakes

These lakes were constructed as storm water retention facilities to prevent large fluctuations in volume and speed of the storm water entering the West Fork of Clear Creek. Trident lakes serve as the headwaters of this stream. This arm of Clear Creek supports the following anadromous species: Steelhead trout, Chinook salmon, Chum salmon, Coho salmon, as well as Sea Run Cutthroat trout.

The Trident lakes area is currently used as a recreational area having such amenities as picnic tables, restrooms, outdoor cooking facilities, and playground equipment.

The lakes are stocked with cacheable rainbow trout in order to allow for a put and take fishing opportunity.

Wilkes Marsh

Wilkes marsh is a natural marsh that has been deepened in spots by a peat farming operation that took place prior to Navy ownership. It not only provides habitat for a robust herptilian population, but also provides nesting habitat for waterfowl such as mallards, widgeon, buffleheads, and northern shovelers. The over flow of this marsh flows to Cattail lake and due to the peaty soils, provides and excellent source of nutrients into the system.

Bullhead Marsh

Bullhead marsh is a wetland area created in part by the construction of Bullhead Road. It is the home to an active Osprey nest and contains a diverse herptillian population. It also provides nesting habitat for species of waterfowl previously mentioned.

In 1998, the southern portion of this marsh was dedicated to the memory of Sgt. Maj. Nicholas W. Shupe. Sgt. Maj. Shupe had given a great deal of support to the Fish and Wildlife program as well as serving as SUBASE Game Warden for a time.

Hunters Marsh

This marsh was created when the Navy constructed the Explosive Handling Wharf (EHW). The marsh is adjacent to a Great Blue Heron rookery as well as providing habitat for amphibian species and aforementioned waterfowl species.

Lake Ruth

The impoundment was built to serve as an interim sewage lagoon while the transition was made between an existing sewage treatment plant and the new plant built by Kitsap County. A unique feature is the lack of any incoming or draining streams. The lake has no surface convection to other fish habitat.

After extensive sampling, it was decided to use this lake as a recreation outlet for spiny-ray fishing. 2,000 large mouth Bass fingerlings were purchased and planted into the lake. Working with WDFW, it was determined that the Bass numbers had increased, there were 3 distinct age classes, and the size of the fish had increased to about 1.5lbs. Bluegill were then introduced as a forage species and opened a catch and release fishery. This lake is now fished having a limit of 8 Bluegill, and 3 Bass less than 12" in length or greater than 18" in length.

The lake also supports waterfowl as well as amphibian species. It had Bullfrogs introduced in the early 1980's, but is the only body of water that has a non-native introduced species.

Floral Point Salt Water Marsh

Despite the challenges of salt and tides, salt marshes are among the most productive ecosystems on the planet. Without one ounce of fertilizer or pesticide, salt marshes raise a crop tilled only by the tide. They produce twenty times more food than an equal area of open sea, and twice as much food as a comparable cornfield. (Taken from "*Wildlife Habitats*", Janine M. Benyus, 1989). The salt marsh at Floral Point is less than one acre in size yet supports a diverse population of both plant and bird species. Sedges, rushes, perennial pickleweed are but a few of the plants that flourish here. Gulls, dowitchers, dunlin, and killdeer, are bird species that are prevalent in this area. This marsh acts as a buffer between the uplands and the marine habitat. It serves as a reservoir of food and as a shelter when bad weather occurs. As this is the largest salt marsh at SUBASE, it is vital to maintain this area in its present condition so as to preserve the diversity in this area.

These water resources are unique, valuable, and are to be protected. These facilities will be used to their full potential in providing the following:

- Quality habitat for all species that use them.
- The potential of these areas to provide habitat for T & E or State sensitive species will be explored.
- Fisheries potential, chum salmon and cutthroat trout, will be evaluated and implemented.

4.11.2 Surface Water Quality Monitoring

There is currently a contract between the Navy and Washington Department of Fish and Wildlife addressing erosion along the headwaters of Devil's Hole Lake. Silt and runoff associated with erosion are problems on the base. Efforts will be made to identify and minimize erosion.

4.11.3 Ground Water Quality Monitoring

A hydrogeology study of SUBASE Bangor and vicinity was completed by the U.S. Geological Survey in 1998 (USGS Water-Resources Investigations Report 97-4060). This study was conducted to provide the knowledge of hydrogeologic framework and directions of ground water movement. Maps of water levels in wells indicate that ground water moves from inland areas of higher altitude toward streams or near-shore areas of lower altitude.

Aquifer water levels are monitored quarterly. Wells along the shoreline are also monitored for sea water intrusion.

4.12 Wetlands Protection

Wetland protection is vital to the ecological integrity of the aquatic resources on and adjacent to SUBASE Bangor, Camp Wesley Harris and Toandos Buffer Zone (wetland?). Hood Canal and the upland streams have been heavily impacted over the years through sedimentation and loss of wetlands. Wetlands play a vital role in cleansing runoff of dissolved and particulate pollutants before they reach open waters such as Hood Canal and Dyes Inlet. Destruction of wetlands through construction can result in free passage of sediments to streams. Strict regulations are in place regarding the disturbance of wetlands. The Natural Resources Branch will be the lead group in overseeing all wetland protection measures.

4.12.1 Federal Wetlands Policy

The current administration has issued a wetlands policy decision that maintains five principles. They are as follows:

- Support the interim goal of no overall net loss of the Nation's remaining wetlands, and the long-term goal of increasing the quality and quantity of the Nation's wetland resource base.
- Regulatory programs must be efficient, fair, flexible, and predictable; must be administered in a manner that avoids unnecessary impacts upon private property and the regulated public; and must minimize those effects that cannot be avoided, while providing effective protection of wetlands.
- Non-regulatory programs such as advanced planning, wetlands restoration, inventory, research and public/private cooperation must be encouraged to reduce the Federal government's reliance upon regulatory programs as the primary means to protect wetland resources and to accomplish long-term wetland gains.
- The Federal government should expand partnerships with state, tribal and local governments, the private sector, and individual citizens, and should approach wetlands protection and restoration in an ecosystem/watershed context.
- Federal wetlands policy should be based upon the best scientific information available.

4.12.2 Wetland Delineation

The first line of wetland protection is identification and documentation of wetland resources at SUBASE Bangor, the Annex, Camp Wesley Harris and Toandos Buffer Zone. Wetlands are generally considered to be ecosystems that are transitional zones between terrestrial and aquatic ecosystems and are flooded and/or saturated near the ground surface for extended periods. These areas are characterized by physical and biological features indicative of hydrological conditions.

Wetlands are currently regulated by the US Army Corps of Engineers under Section 404 of the Clean Water Act of 1972. The wetlands delineation for SUBASE Bangor was performed by the US Fish and Wildlife Service National Inventory Maps and SUBASE Bangor's were checked for accuracy by Soil Conservation Service and the Puget Sound River Basin Team in 1987. Potential wetland areas on SUBASE Bangor and Camp Wesley Harris were examined and categorized for jurisdictional wetlands by the BOSC (Johnson Controls, 1992 and 1993).

In order for an area to be classified as a wetland, it must display (1) hydric soils, (2) hydrophilic vegetation, and (3) indicators of wetland hydrology. The delineation conducted is helpful for information to planners and developers who are looking for new construction sites. However, this information should only be used in the planning phase. These delineations were not flagged or surveyed in the field; therefore, they should be considered rough estimates. If a project is planned in the proximity of a wetland system, the wetlands in the immediate area should be flagged and surveyed.

SUBASE, Bangor, contains wetlands that have been in existence for a very long time and have been determined to be "naturally occurring." Other wetlands were created in the 1940's when the Navy acquired the property. These wetlands were man-made as the result of construction activity such as road building. These categories of wetlands have been in existence for long enough duration that a diverse native plant species community has been well established, see wetland plant species list in Appendix 4. During the major construction activity involved in converting the Ammunition Depot into SUBASE, other wetlands were created. These wetlands are relatively new having been created as the result of construction, mitigation for construction, or as storm water retention/detention areas.

It is in the newly created wetlands in which the diversity is low that the work proposed in this document is planned. The "older" wetlands afford SUBASE the opportunity to remove samples of some plant species and then plant them in less diverse wetlands. The Clean Water Act together with an Executive Order that states "there will be no net loss of wetlands" protects these areas from destruction by proposed construction projects and allows for the mitigation of impacts to these areas.

SUBASE Bangor has delineated 254-acres of wetlands. Hydric soils found within SUBASE Bangor boundaries include beaches, Custer sandy loam, McKenna gravelly loam, Mukilteo muck and Norma fine sandy loam. Camp Wesley Harris has the McKenna soils that are classified as hydric soils.

Estuarine Ecological System wetlands are deep-water tidal habitats and adjacent tidal lands that are occasionally diluted by freshwater runoff from the land (Cowardin et al. 1979). Wetlands in this system lie in front of Cattail Lake, Devil's Hole Lake, and Hunter's Marsh.

The Palustrine Ecological System is comprised of wetlands that are usually dominated by vegetation. This includes areas that have traditionally been called marshes, swamps, bogs, fens, ponds and sloughs. Many of these small wetlands are scattered through the forested portions of SUBASE Bangor. Wilkes Marsh is identified as a noteworthy Palustrine wetland in the Upper Hood Canal watershed (Nelson 1993). It is a four-acre, man-made marsh, partially deepened by a peat farming operation that took place prior to Navy ownership. It not only provides habitat for herptilian populations, but also provides nesting habitat for waterfowl including mallards, American widgeon, buffleheads, and northern shovelers. The overflow from this marsh flows into Cattail Lake, and due to the peat soils, provides an excellent source of nutrients into the system.

The Riverine Ecological System includes all wetlands within channels which have moving water. Within the boundaries of SUBASE Bangor, there are five drainages to Hood Canal and one drainage to Dyes Inlet. Three streams drain directly into Hood Canal and two drain indirectly through Cattail Lake and Devils Hole. The East, Middle, and West Forks of Clear Creek begin on SUBASE but flow off base. Camp Wesley Harris drains to Dyes Inlet through Wildcat Creek and Chico Creek. Toandos Buffer Zone drains to Hood Canal through three unnamed streams.

4.12.3 Wetland Regulations

These surveys and maps are not all inclusive and useful in planning stages of development, a Jurisdictional Determination from the Army Corps of Engineers should be obtained prior to any disruptive activities around wetlands. As additional wetlands are located, they will be delineated and documented. Proposed construction or development sites will be individually examined for the presence of wetlands. Construction in, or modification of, wetlands will be avoided or mitigated in accordance with the Clean Water Act, and Navy policy.

The Army Corps of Engineers regulates the discharge of dredged and fill material in all US waters, including wetlands. Any discharge into waters of the United States requires a permit from the EPA. The State of Washington requires hydraulic permits for work within the waters of Washington. The nature of regulated activities is broadly interpreted and may include filling, grading, clearing, grubbing, excavation, driving piles, etc. At this time, it should be considered that any activity within a jurisdictional wetland area requires a permit from the Army Corps of Engineers and Washington State Department of Fish and Wildlife. Wetland regulations and policies are constantly evolving and changing. Reauthorization of the Clean Water Act may lead to dramatic changes in wetlands definitions, delineation methodologies, and/or regulations.

4.12.4 Wetland Disturbances

While wetland protection is essential, avoidance of wetland impacts is sometimes not feasible. In order to fulfill a "no overall net loss" policy, wetland mitigation must be carried out to compensate for losses. Historically, this has been accomplished through individual project planning. Wetland mitigation refers to the restoration, creation, enhancement, and, in certain

defined circumstances, reservation of wetlands, expressly for the purpose of providing compensatory mitigation in advance of discharges into wetlands authorized under the Section 404 regulatory program. Mitigation banking is becoming a popular approach for the following reasons:

- Banking allows immediate compensation for wetland disturbance.
- Because mitigation banks are typically large, they have the potential for creating a more stable wetland ecosystem than a series of smaller mitigation sites.
- Banking can relieve the responsibility that mitigation issues can impose upon individual project planning.

The Natural Resources Staff will continue to make wetland protection a priority and will explore a mitigation banking strategy for SUBASE Bangor, the Annex, Camp Wesley Harris and Toandos.

The following measures will be taken to protect and manage wetlands.

- Encourage project managers to coordinate early with the Environmental Division to determine adverse impacts to wetlands.
- Constrain development to avoid wetland impacts to the maximum extent possible and mitigate unavoidable impacts.
- Review Operation and Maintenance programs that potentially impact wetlands, and develop procedures and guidelines to avoid loss of wetland functions.
- Pursue water quality management procedures that protect wetlands from excessive silt-laden runoff (e.g., plant grasses, silt fences, water bars).
- Consider impacts of forestry operations on wetlands, especially wooded wetlands.
- Wetland diversity planting. Cottonwood does well under wet conditions, grows fast and can create biomass, which is desired by some wildlife species.
- Revegetate disturbed areas annually.
- Monitor storm water, as required, and implement a storm water pollution prevention plan.

4.13 Soil and Fill Reserves

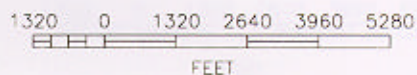
A soil survey of SUBASE Bangor and Camp Wesley Harris was completed in 1994 (Figure 2). Soil resources such as sand, topsoil, and construction-grade fill have been located on or near SUBASE Bangor. As the base continues to grow, it may prove profitable to guide development in such a way as to maintain availability of areas known to contain these resources.

Following large storm events, personnel from the Environmental Resources Division will monitor streams, lake outlets, areas susceptible to erosion, shorelines, storm water ponds, and known unstable areas. Environmental personnel will be in contact with base security, who will check roads and known unstable areas for damage. Mitigation, repair and maintenance plans are made at that time.

Included in the hydrogeology study of 1998 (described above in Ground Water) is a surficial geology project report and map. The mapping was conducted by the USGS and was completed in 1995.

SOILS

SUBASE Bangor



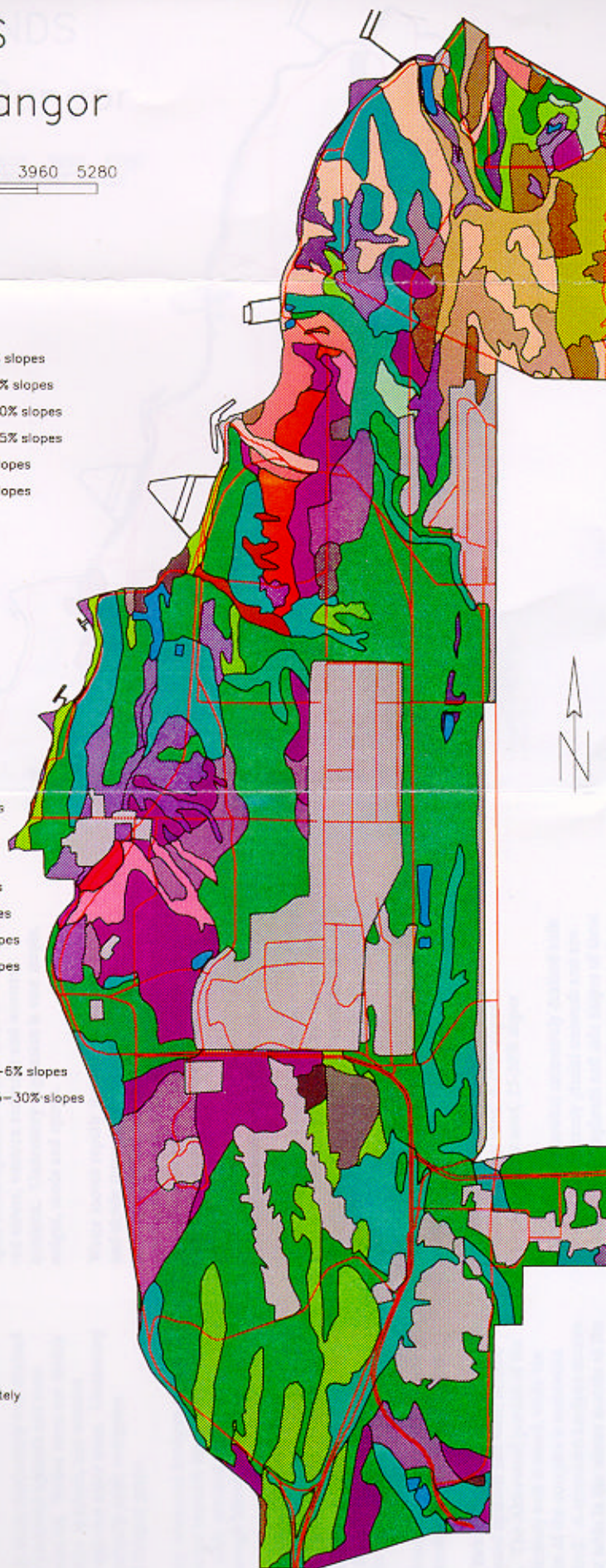
LEGEND

- Alderwood very gravelly sandy loam, 0-6% slopes
- Alderwood very gravelly sandy loam, 6-15% slopes
- Alderwood very gravelly sandy loam, 15-30% slopes
- Alderwood very gravelly sandy loam, 30-45% slopes
- Alderwood-Indianola Complex, 15-30% slopes
- Alderwood-Indianola Complex, 30-45% slopes
- Beaches
- Custer sandy loam, 0-5% slopes
- Indianola loamy sand, 0-6% slopes
- Indianola loamy sand, 6-15% slopes
- Indianola loamy sand, 15-30% slopes
- Kitsap silt loam, 2-5% slopes
- Kitsap silt loam, 8-15% slopes
- Kitsap silt loam, 15-30% slopes
- Kitsap silt loam, 30-45% slopes
- McKenna gravelly loam
- Mukilteo peat
- Neilton gravelly loamy sand, 3-15% slopes
- Norma fine sandy loam
- Pits
- Poulsbo gravelly sandy loam, 0-6% slopes
- Poulsbo gravelly sandy loam, 6-15% slopes
- Poulsbo gravelly sandy loam, 15-30% slopes
- Poulsbo gravelly sandy loam, 30-45% slopes
- Ragnar fine sandy loam, 0-6% slopes
- Ragnar fine sandy loam, 6-15% slopes
- Ragnar fine sandy loam, 30-45% slopes
- Shelton extremely gravelly sandy loam, 0-6% slopes
- Shelton extremely gravelly sandy loam, 15-30% slopes
- Disturbed Cemented Till
- Water



Camp
Wesley
Harris

Located approximately
six miles south of
SUBASE Bangor



Significant soil resource areas will be identified. Benefits of maintaining access to the areas will be considered when reviewing development plans.

Hood Canal waters are listed as pristine by the State of Washington. SUBASE will continue to emphasize good housekeeping practices to all who work on or near the Hood Canal. All projects that are applicable will be completed only when a Hydraulic Project Application has been approved by WDFW.

4.14 Management Units

Natural resources are incorporated in six Management Units. These management units generally follow existing fence-lines and roads within the SUBASE and are labeled Bangor: North, South, East, and West. There are two additional management units at the satellite installations of Camp Wesley Harris, and Toandos Buffer Zone. Management unit boundaries are shown on Figure 3.

4.14.1 Bangor South

Bangor South, 1,880 acres, is the primary area of personnel support. All of the base housing, commissary, public works is located within this unit. Surrounding the individual concentrations of housing and service areas is 1,000 acres of forest land.

4.14.2 Bangor West

Most of the operational portion of SUBASE Bangor is located within 3,430 acres of Bangor West. This unit contains submarine maintenance and support as well as munitions storage facilities. Much of the Bangor salt water beaches are within this unit. The individual facilities are spaced within the unit and are surrounded by the ESQD arcs. The surrounding areas of the operational areas consist primarily of 2,055 acres of forest land.

4.14.4 Bangor East

Bangor East, which is 1,071 acres, consists of the NUWC munitions storage facilities operated by the Naval Undersea Warfare Center at Keyport, WA. The individual munitions storage bunkers are surrounded by 668 acres of forest land.

4.14.5 Bangor North

The northern most management unit of 820 acres is the most remote on the SUBASE. This unit contains the magnetic silencing facility. Primarily this unit consists of 699 acres of forest land, a lake, and salt water beaches. It is within several ESQD arcs. It is managed for its wildland component.

4.14.6 Camp Wesley Harris

Camp Wesley Harris is a detached satellite installation of 388 acres approximately 10 miles south of SUBASE Bangor. While this management unit has a few administrative buildings, its primary function is as a firing range for small arms. Within this use, the 358-acre forest is managed for its natural resources. When firearm use is occurring, it is off limits for other activities.

NAVAL SUBMARINE BASE, BANGOR
INRMP MANAGEMENT UNITS

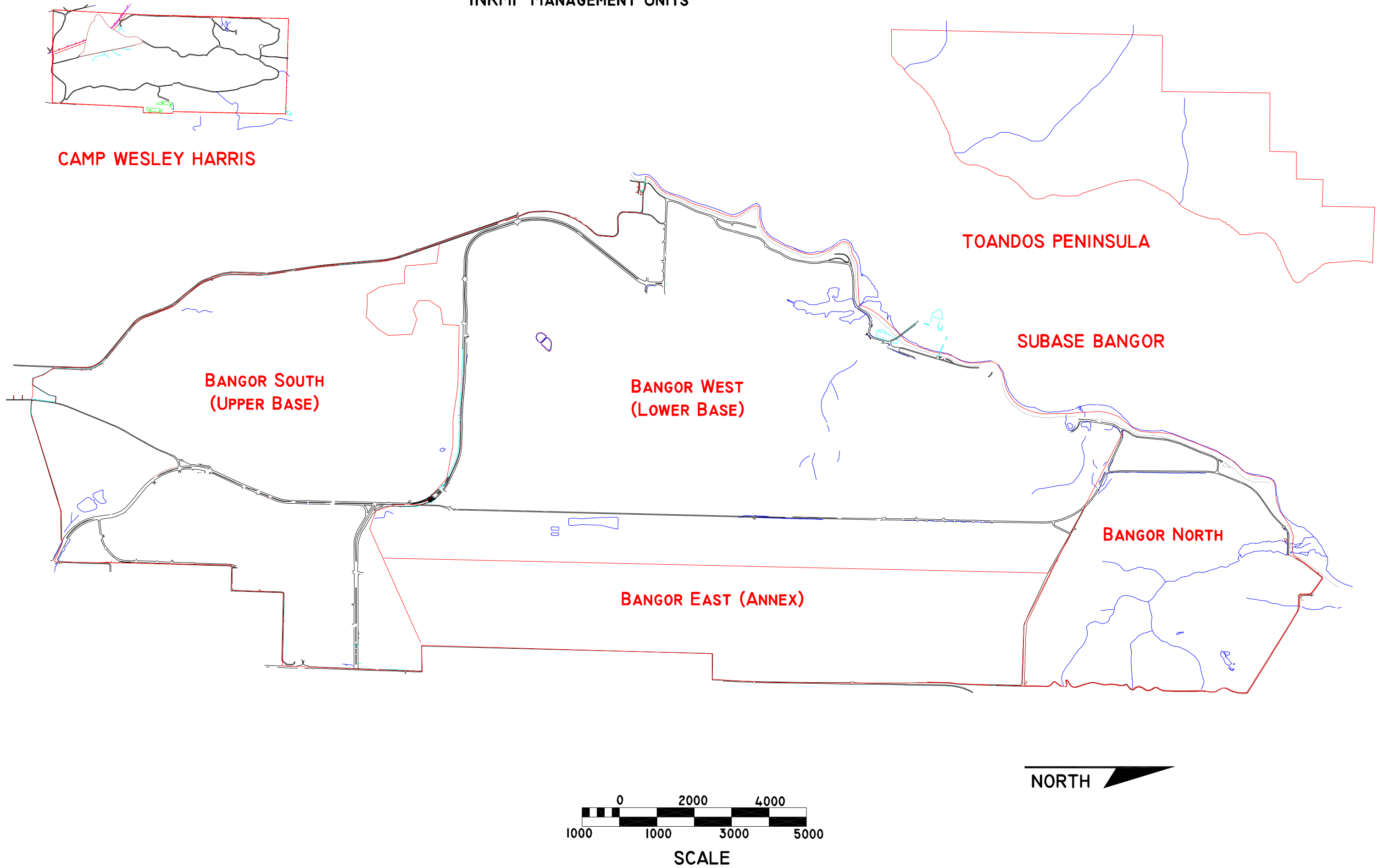


FIGURE 3

4.14.7 Toandos Buffer Zone

This 768-acre unit is located across Hood Canal from SUBASE Bangor. Its military use is a buffer to restrict other uses directly across Hood Canal from the submarine support facilities. Other uses consist of management of natural resources including 723 acres of forest.

5.0 Forestry

As a steward of public land containing timber resources, it is the responsibility of SUBASE Bangor to actively manage its forests for conservation, utilization, and enhancement while maintaining environmental conditions that are consistent with the military missions of SUBASE Bangor, the Annex, and the satellite areas.

A forest is defined as a biological community dominated by trees and other woody plants. Specific forest types encountered on SUBASE Bangor were surveyed in 1990. Forested areas account for approximate 79% (3,754 acres) of the land cover at SUBASE Bangor; 62% (668 acres) at the Annex; 92% (358 acres) at Camp Wesley Harris; and 94% (723 acres) at the Toandos Peninsula. These areas have the potential to provide commercial products, wildlife habitat, recreation, and other benefits such as noise attenuation and aesthetic value

5.1 Applicable Federal Laws, Regulations and Policies

A series of Federal, state and local laws, regulations, and policies have the potential to impact activities within forested areas of SUBASE Bangor, the Annex, and the satellite areas. These activities include harvesting, road construction, sediment and erosion control, clearing, and recreation. The more general, broad-based laws that apply to other areas are described in the introductory chapter of this document. Laws that pertain particularly to forestry are described below.

Table 8. Federal Laws and Department of Defense/Department of Navy

Instructions

<i>10 USC 2665 Sale of Certain Interests in Land; Logs</i>	This title authorizes the sale of forest products and the reimbursement of the costs of managing forest resources for timber production.
<i>16 USC 1601 et seq. Forest and Rangeland Renewable Resources Planning Act.</i>	This act requires an inventory of potential renewable resources and an evaluation of opportunities for improving their yield on goods and services. Agencies must provide an opportunity for public involvement and consultation with other agencies in establishing policies for multiple use and sustained yield.
<i>DODINST 7301.5, Accounting for Production and Sale of Timber and Timber Products</i>	This instruction provides guidelines for the production and sale of forest products and the reimbursement of the cost of forest management towards this goal.
<i>NAVCOMPT Manual Volume 3</i>	This instruction provides guidelines for the production and sale of forest products and the reimbursement of the cost of forest management towards this goal.
<i>NAVFAC P-68, Navy Contracting Manual</i>	This manual outlines the procedures for handling service contracts for work such as reforestation, timber-stand improvement, or fire prevention. Also included are procedures for advertising, bidding and awarding contracts.

5.2 Goals and Objectives

The goals for forest management at SUBASE Bangor, the Annex, Camp Wesley Harris and Toandos Peninsula Buffer Zone are:

- Maintain healthy, biological diverse forested ecosystems that will sustain native populations of flora and fauna;
- Support an optimal mix of multiple uses/values (both consumptive and non-consumptive) of the resources; and
- Maintain forests in a condition that minimizes threat to safety and human health.

Each of the specific goals defines a basic need demanded of the INRMP. In order to meet these goals, the following objectives are:

- Improve the ratio of native to exotic plant species;
- Maintain or increase the populations of area-sensitive or area-dependent forest species;
- Ensure the vegetative composition in the forested areas represent mature deciduous species;
- Provide supply of commercial forest products;
- Maintain or increase the number of compatible uses in individual forested areas;
- Provide forest resource information to personnel;
- Improve surface water quality on the areas covered under this INRMP;
- Improve safety for working personnel in forest areas;
- Expand inventory description of Forest Resources to include understory.

The key issue in forest management at SUBASE Bangor, the Annex, Camp Wesley Harris and Toandos Buffer Zone is the potential conflict between ecosystem management for the purpose of achieving biodiversity goals, and the intent to maintain a profitable and successful commercial forest products program. The biodiversity goal implies that forests be managed as contiguous areas with an emphasis on climax species, while the commercial products objective implies fragmentation through harvesting with an emphasis on early to mid-successional species.

These concerns will be addressed by selecting portions of the forests at SUBASE Bangor, the Annex, Camp Wesley Harris, and Toandos Buffer Zone and managing for the biodiversity goal. These areas will be contiguous forests in which future development will be severely restricted or prohibited, thus allowing forest resources to reach the climax stage. These areas will be treated as preserve areas for native species and will be periodically monitored and management needs assessed in order to achieve the stated goals.

5.3 Description of Forest Resources

A forest is defined as a biological community dominated by trees and other woody plants. A timber inventory was conducted on SUBASE Bangor and the Annex in 1990. A forest inventory, including vegetation type, species composition, canopy closure, height, etc. will be conducted in FY00.

5.3.1 Understory

Growing beneath the forest canopy and of great importance to the total ecosystem, is the understory, or vegetation of the forest floor. This plant community varies with forest overstory, soil type, slope, aspect, and moisture regime. Many understory plants provide browse, cover, nesting sites, and fruit to support wildlife. The diversity in understory ecosystem supports a wide variety of birds, insects, mammals, and herptilian species.

Dry sites are dominated by an ericaceous understory of salal, rhododendron, and huckleberry, supplemented by sword fern, Oregon grape, salmonberry, and blackberry. Under open dominant crowns, an intermediate understory develops with shade tolerant hemlock, and cedar, supplemented by vine maple, madrone, elderberry, yew, and cascara.

Moist understories are often dominated by salmonberry, sword fern, or stinging nettle, and supplemented by devils club, lady fern, and blackberry. Moist forest intermediate understories are similar to those described for dryer sites, above.

5.3.2 Wetland Flora

Plant species found in and around wetlands can be characterized as “obligate” when found 99% of the time in wetlands, “facultative wetland” when found 67 – 99% in wetlands, or “facultative” if found 34 – 66% in wetlands. Obligate wetland plant species found on SUBASE include, yellow pond lily, cattail, skunk cabbage, bulrush, water parsley, pickleweed, veronica, pondweed, duckweed, water cress, smartweed, and monkey flower. Facultative wetland plants found include hardhack, ladyfern, aspen, salmonberry, sedges, rushes, crabapple, alder, aster, gumweed, saltgrass, saltweed, buttercup, silverweed, willow, and reed canary grass.

5.3.3 Forested Area

Table 8. Forest Area in Acres by Decade of Origin and Management Unit.

Stand origin by decade	North Unit	West Unit	South Unit	East Unit	Toandos Unit	Camp Harris	Total Acres	Age
1890+	0	77	109	0	0	40	226	110
1900	71	185	54	8	146	8	472	100
1910	30	259	107	109	7	141	653	90
1920	149	434	345	238	148	25	1339	80
1930	350	208	238	20	52	24	892	70
1940	39	280	64	72	214	1	670	60
1950	38	325	17	32	66	10	488	50
1960	5	60	36	76	0	9	186	40
1970	0	48	5	3	24	70	150	30
1980	17	179	25	110	66	30	427	20
	----	----	---	-----	---	----	-----	
Total	699	2055	1000	668	723	358	5503	

This management plan will integrate natural resources management projects. This emphasizes opportunities for enhancing quality fish and wildlife habitat. Management integration must be watershed based; though mitigation can only be taken on owned lands. Forest management will use uneven aged silviculture to develop diversity and improve habitat for indigenous species. The potential for fragmentation of various types of habitat will be mitigated through linking corridors of similar ecosystems. Silvicultural treatments will concentrate on developing structure within stands, such as multistories, snags, large woody debris, created openings and large size trees. The understory will be augmented with a variety of native shrubs and forbs to complement preferred wildlife species needs. The management will be altered in different locations to attract or reduce specific species use (i.e. bear around housing) to be compatible with human use. While native fish, wildlife, and floral species will be supported, non-native species will not. Some exceptions will be allowed with the agreement of the SUBASE Forester and Wildlife Biologist, such as the Blue Gill and Bass fishery in the Lake Ruth impoundment, and the use of annual rye grasses in erosion control projects.

Timber harvest will occur in support of the military mission, to open ground for construction of facilities, and in the development process of specific types of habitat. It is envisioned that most forest stand development harvests will be thinning or creating small openings, with the objective to create variety and structure within stands.

5.4 Timber Management

5.4.1 Timber Growing Capabilities

International Forestry Consultants Inc. (INFO) conducted the most recent inventory of the SUBASE timberlands in 1990. The INFO (1990) inventory established that there are 5,503 acres of timber supporting a current net volume of 97.8 million board feet of timber under the jurisdiction of SUBASE Bangor. Camp Wesley Harris comprises 358 acres and 2.5 million board feet of the total, NUWC Ordnance Annex has 8.6 million board feet on 668 acres, and the Toandos Buffer Zone has 13.4 million board feet on 723 acres. The remainder is located within the boundaries of the SUBASE. These 5,503 acres are generating an annual net growth of 2.3 million board feet per year, representing a yearly growth of about 2.4%. An evaluation of the timber-growing capabilities of SUBASE Bangor lands, by using Douglas-fir 50-year site indices, indicates that 62% of these lands are rated as average or better, while the remaining 38% of lands are divided evenly into timber growing categories of poor and very poor. The reduced harvest activities that began in the decade of the 1940s are reflected in the ages of the current stands on SUBASE Bangor. About 30% of the stands on the base are less than 50 years old, having originated in the years

between 1940 and 1990. Fifty percent of the stands on SUBASE are 60 to 70 years old, with origins in the 1920s and 1930s. The remaining 20% of the stands on base are older than 70 years. The same criteria applied to the 358 acres of timberland at Camp Wesley Harris shows that only 4% of the lands are rated average, 27% are rated poor and the balance of 69% are rated very poor. Growing capacity at Toandos Buffer Zone is 72% average or better, and 28% poor and very poor.

5.4.2 Sustainable Forestry

Forest management will provide timber harvest within the next five-year cycle in support of the military mission; open ground for construction of facilities; salvage damaged trees; and develop specific types of habitat. It is envisioned that most harvests will be thinning of stands, or creating small openings, with an objective to create variety and structure to accelerate stand develop toward old-growth type conditions. Timber harvest with the sole objective of providing timber products and regenerating stands is not planned. Harvest levels are expected to produce approximately 500 MBF/year, with annual variability, generated from the need for construction clearing and habitat development. Planning estimates are that approximately 20 acres of thinning and 15 acres of small created openings per year will be accomplished. Created openings will be regenerated within 5 years, funded with harvest receipts.

Other forest management activities will help encourage development of young forested stands. Young plantations under 10 years of age will in the future normally be managed in small irregular openings, generally under 10 acres and have scattered large trees interspersed. Young forest plantations will be managed for a mixture of species, including red alder and other deciduous species. Planting, thinning, pruning, and fertilization of young stands are tools to ensure open stocking levels, diverse species composition, high quality trees and stand development. It is expected that approximately 15 acres/year of stand improvement may keep up with young stand development needs. Small patches of alder can be left dominant and managed as such for deciduous type habitat.

Forest stands in the Competitive Exclusion Stage (CES), the second of eight hypothetical stages of forest ecosystem development (see Appendix 3, Definitions) (Carey et al 1995) that are very dense with little or no understory component, have the least use by species of wildlife. These stands would benefit from thinning, which would allow light to reach the forest floor and enhance understory development. This will help move those stands into the Understory Reinitiation Stage (URS), the third hypothetical forest ecosystem stage, which exhibits increased use by a variety of wildlife species which can utilize mid- to late-successional forest stages. As forest stands slowly evolve through the hypothetical stages towards old growth, there will be increased use by wildlife species that utilize late-successional forest stages.

Mostly single species stands need Timber Stand Improvement (TSI) projects, such as young stand thinning, in order to encourage development of minority species for diversity. These mostly monoculture stands can be either deciduous or coniferous. The need is especially true in young second growth. Thinning to release minor species and allow growth of all remaining trees is important. During regeneration activities, efforts will be made to gain a variety of species for the future stand. This includes red alder, which is most beneficial as a minor species within a coniferous stand as it can fix nitrogen, which is inaccessible to other plant species for use by them. Western Red Cedar is also valuable as it does well as an understory species, is long lived, disease resistant, attains a large size and is well used by wildlife species. Other species that are particularly desirable for wildlife include hazelnut, and cottonwood. Because of the potentially large amount of volunteer hemlock found on SUBASE Bangor, it is would best be managed so that future stands don't become monocultures of that species.

The INRMP management area that has sustained the least amount of development and forest management is the Bangor North planning area. There have been six areas thinned, and a harvest and following planting of a young 5-acre plantation. Bangor North contains the best soil and the largest trees on the base, and therefore has the most potential for promotion of old-growth structural characteristics. While there is opportunity to manipulate some stands to assist in developing these conditions at a faster rate, it would also be beneficial to leave some stands to develop naturally.

The forest stands in Bangor West tend to be heavily coniferous or deciduous. There is an abundant amount of alder, especially around wetlands. Opportunities to develop diversity exist within these stands. Stand treatments include harvesting "fingers" into uniform stands and planting with diverse species that may include western red cedar, grand fir, native nut trees, hawthorns, or bitter cherry.

5.4.4 Military Use and Restrictions

Military uses and restrictions are the primary motivation in any management scheme at SUBASE Bangor. Semi-improved areas and other modified areas that are capable of being brought into forest production should be

assessed. This would include areas that are currently mowed or rough mowed that could potentially produce forest products without causing problems for current military land use.

Timber harvest will occur in support of the military mission, to open ground for construction of facilities, and in the development process of specific types of habitat. It is envisioned that most forest stand development harvests will be thinning or creating small openings, with the objective to create variety and structure within stands.

5.5 Watershed and Wetland Protection

The role of forests in protecting and enhancing clean water supplies cannot be overstated, and increase demand for clean water has placed additional pressure on forest managers. Each watershed and sub-watershed on SUBASE Bangor and associated sites should be considered as one system when determining how forests will be managed to protect and enhance water quality. A watershed is defined as an area through which precipitation is redistributed into components of the hydrological cycle, such as infiltration, stream flow, evapotranspiration and evaporation. Each watershed possesses its own unique physical, chemical, and biological properties that determine how water will react within that system.

5.6 Fish and Wildlife Habitat

Second only to water quality and watershed protection, fish and wildlife habitat is probably the most important function of forest resources. Forested areas provide those things necessary for completion of at least one portion of the life cycle of most species found in the area. These needs may be food, shelter, nesting or breeding sites, wintering habitat, escape from predators, and/or clean water. Many species rely on forest areas for all of the above mentioned reasons and many others for at least one or some of them. However, not all species rely on the same types of forests, and some species may rely on different forest types for different portions of their life cycle. For this reason, management goals must be carefully considered and management must be geared toward the species of concern.

The most important indicator of success of the forest management prescription for the maintenance and restoration of critical ecosystem functions is the monitoring of species that are considered area sensitive and require some critical mass of continuous forest type in order to survive. The monitoring of populations of these species is crucial in determining the success of forest management.

In most cases, management for another use is consistent with providing some fish and wildlife values. However, these secondary issues must be carefully considered to avoid potential problems. For example, management of roadways should not include the encouragement of plant species that would attract deer. This would result in increased probability of deer/vehicle accidents.

The Camp Wesley Harris management area has not been surveyed for its wildlife species. Prior to developing management techniques, it must be surveyed to include birds, amphibians, and mammals. Until that is done, forest management for wildlife habitat development will be curtailed.

The Toandos management area contains diverse habitat, including some of the best old growth type structure to be found on the base. Some of this habitat is used or may be used by threatened species. As well as the threatened wildlife species, there are also streams which contain listed Hood Canal Summer Chum salmon spawning habitat. All habitat of listed species must be protected and or improved. One of the needs for the Toandos management unit is a survey which will identify habitat needs.

5.7 Proposed Management and Conservation Measures

5.7.1 General Forest Management

Forest areas should be managed such that they provide for multiple uses and their functions are maximized. Management prescriptions for outlying forested areas will need to be developed on a case by case basis as additional information is collected

5.7.2 Specific Forest Management Prescriptions

5.7.2.1 Clearcutting

Clearcutting involves the removal of a group of trees in one cutting. This type of harvest has a heavy short-term impact and is imitative of natural forest disturbances such as wildfire and windstorm damage. Clearcutting is a tool for removing timber from the site. It may be used to clear sites for construction, or to clear some groups of trees from monoculture stands to allow planting of diverse species. The land clearing will involve only those areas needed to successfully complete the land development activity. Efforts will be made to preserve woody species for landscape elements where appropriate and practicable.

5.7.2.2 Selective Harvesting

Selective harvesting is the cutting of individual trees for a specific purpose. This may entail the harvesting trees of a particular size and species in a natural stand. This type of harvest has much less impact than clearcutting and is more imitative of minor natural disturbances. It is the preferred method of timber harvest in most cases.

Local markets exist for specialty products such as high quality poles and piling.

Limited selective harvesting will be allowed within sensitive habitat areas as long as the following conditions are met:

- A designated species and size tree is needed and not available anywhere else;
- The tree can be harvested with minimal disturbance to the surround area, including canopy closure;
- The tree to be harvested is not so important for wildlife that the harvest would detrimentally impact the habitat of a particular species in the area;
- The tree is not providing water quality benefits through stabilization of an erosion-prone area; and
- Trees to be harvested are not adjacent to each other or other recent harvests so that a clearing would be produced within the sensitive area.

5.8 Proposed Projects

This management plan will integrate natural resources management projects. This emphasizes opportunities for enhancing quality fish and wildlife habitat. Management integration must be watershed based; though mitigation can only be taken on owned lands. Forest management will use uneven aged silviculture to develop diversity and improve habitat for indigenous species. The potential for fragmentation of various types of habitat will be mitigated through linking corridors of similar ecosystems. Silvicultural treatments will concentrate on developing structure within stands, such as multistoried, snags, large woody debris, created openings and large size trees. The understory will be augmented with a variety of native shrubs and forbs to complement preferred wildlife species needs. The management will be altered in different locations to attract or reduce specific species use to be compatible with human use. (i.e. bear around housing) While native fish, wildlife, and floral species will be supported, non-native species will not. Some exceptions will be allowed with the agreement of the SUBASE Forester and Wildlife Biologist, such as the blue gill and bass fishery in the Lake Ruth impoundment, and the use of annual rye grasses in erosion control projects.

Young plantations under 10 years of age will be in small irregular openings, generally less than 10 acres and have scattered large trees interspersed. Forest plantations will have a mixture of species, including red alder and other deciduous species. Planting and/or thinning of young stands will ensure open stocking levels and diverse species composition. Small patches of alder will be left dominant and managed as such for deciduous type habitat. Stands in the Competitive Exclusion Stage (CES) with little or no understory component will be thinned in order to let light into the stand for understory development. Single species stands need timber stand improvement projects in order to encourage a variety of species. During regeneration activities, efforts will be made to gain a variety of species for the future stand.

Slash from harvest and TSI activities will be managed. As large woody debris from other activities, especially stumps and cull logs following construction clearing, become available, they can be moved into areas which are deficient of large woody debris and used for habitat. Broadcast slash burning will not be used as a method of site preparation.

The Scot's broom and Himalayan blackberries will be removed and replaced with soil building species. Among soil building species, are legumes or alder. No pesticide use is planned.

All actions having the potential to negatively impact the groundwater will be evaluated prior to implementation. Streams will be protected and managed to minimize sedimentation and create healthy riparian ecosystems. Where possible, native riparian tree, shrub and forb species will be cultivated within riparian areas to minimize erosion potential.

Silt and runoff associated with erosion can be problems on the base. Erosion will be identified and controlled.

There is currently a contract between the Navy and Washington Department of Fish and Wildlife to investigate and minimize erosion on Devils Hole Creek.

Snags and danger trees will be removed within one tree height around buildings, housing, paved roads, parking areas, and recreation sites. Standing snags that do not pose a safety concern will be retained to provide wildlife habitat.

A survey will identify and quantify the need for additional coarse woody debris in streams.

A Master Trail Plan has been developed for SUBASE Bangor and gives guidelines to trail development and location. The best locations for trail development would be found in the Devils Hole area, and the West Family Housing area.

5.8.1 Specific Area Management Needs

5.8.1.1 Bangor North

There is opportunity to manipulate stands to grow at a faster rate and increase structural and species diversity, though some stands will be left to develop without management.

5.8.1.2 Bangor West

Harvests will be used to build habitat structure. Some construction is expected in the future with resultant stand harvesting. There are many wetlands and streams which must be protected.

The salt water beach is an important resource. Bangor West has beaches to be managed for shellfish for recreation, commercial, and treaty harvesting.

5.8.1.3 Bangor East

Bangor East is an important habitat area and a preferred location for male deer. The recommended habitat includes a mixture of underbrush in the forest understory and open areas for deer feeding.

Scot's broom will be incrementally removed and the habitat restored.

5.8.1.4 Bangor South

Bangor South is where the living quarters of Navy families and support functions are located. Activities must be integrated with this use. Future construction is expected to reduce available habitat in this area.

5.8.1.5 Camp Wesley Harris

The Camp Wesley Harris management area will be surveyed for its wildlife species and management techniques developed. Forest management for wildlife habitat development will be curtailed until surveys and wildlife planning is completed.

5.8.1.5 Toandos

The Toandos management area contains diverse habitat, including some of the best old growth type structure to be found on the base. Some of this habitat is used or may be used by threatened species. As well as the threatened wildlife species, there are also streams which contain listed Hood Canal Summer Chum salmon spawning habitat. All habitat of listed species must be protected and or improved. The Toandos management unit will be surveyed to identify locations, amount of habitat use, and beneficial future habitat mitigation.

5.8.2 Planned Activities

Table 9 Projected Forestry Projects By Year

Year	2000	2001	2002	2003	2004
Reforestation	20 acres	15 acres	15 acres	15 acres	15 acres
TSI	15 acres	15 acres	15 acres	15 acres	15 acres
Thinning	20 acres	20 acres	20 acres	20 acres	20 acres
Mature Harvest	15 acres	15 acres	15 acres	15 acres	15 acres
Construction	10 acres	10 acres	10 acres	10 acres	10 acres
Rec. Firewood	100 permits	100 permits	100 permits	100 permits	100 permits

Projected Forestry Costs

Year	2000	2001	2002	2003	2004
Reforestation	\$6,000	\$4,545	\$4,681	\$4,821	\$4,965
TSI	\$4,500	\$4,635	\$4,774	\$4,917	\$5,064
Salary + Costs	\$76,124	\$78,408	\$80,700	\$83,121	\$85,614
Road Maintenance	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Yearly Total	\$96,624	\$97,588	\$100,155	\$102,859	\$105,643

Projected Forestry Income

Year	2000	2001	2002	2003	2004
Thinning Sales	\$24,000	\$24,000	\$24,000	\$24,000	\$24,000
Mature Sales	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000
Construction Clearing	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000
Firewood	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
Total	\$190,500	\$190,500	\$190,500	\$190,500	\$190,500

Forest management projects will be designed by collaboration of the forester and biologist to benefit wildlife habitat though diversification of species, age, and spatial relationships of the trees to improve ecological health of the forest.

5.8.2.1 Bangor North Project Area

Commercial Thinning in 20 acres of 50 to 70-year-old Douglas-fir in 2000 will open the stand to allow initiation of an understory, and will speed development of late successional habitat.

Timber Stand Improvement of 5 acres of 20-year-old mixed stands in 2002 will allow diversity manipulation while speeding development of selected trees and allowing the ground vegetation to continue to produce high quality browse.

5.8.2.2 Bangor West Project Area

Mature Cuts on 15 acres each in 2001, 2002, 2004 in nearly pure stands of 50-year-old alder and 70 to 90-year-old Douglas-fir will allow insertion of alternative species into present monoculture stands to promote diversity of species, age and spatial relationships. These cutting units will be small and spread out to provide large edge effects without breaking up migration corridors.

Reforestation will follow the above mature cuts year by year and acre by acre. The Forester and biologist will collaborate on species and stocking prescriptions.

Commercial Thinning will cover 20 acres each in 2003 and 2004 will open the 90-year-old Douglas-fir stand to allow initiation of an understory, and will speed development of late successional habitat.

Timber Stand Improvement of 15 acres of 20-year-old mixed stands in 2001, 10 acres in 2002, and 15 acres in 2004 will allow diversity manipulation while speeding development of selected trees and allowing the ground vegetation to continue to produce high quality browse.

5.8.2.3 Bangor East Project Area

Mature Cuts on 15 acres each in 2000, and 2003 in nearly pure stands 80 to 90-year-old Douglas-fir will allow insertion of alternative species into present monoculture stands to promote diversity of species, age and spatial relationships. These cutting units will be small and spread out to provide large edge effects without breaking up migration corridors.

Reforestation will follow the above mature cuts year by year and acre by acre. The Forester and biologist will collaborate on species and stocking prescriptions. Deer browse will be of special significance in this project area. Commercial Thinning on 20 acres in 2001 will open the 80-year-old Douglas-fir stand to allow initiation of an understory, and will speed development of late successional habitat.

5.8.2.4 Bangor South Project Area

No forest management activities are planned in this project area during the life of this plan. It is anticipated that construction clearing will be required in this area from time to time in support of the military mission.

5.8.2.5 Camp Wesley Harris Project Area

No forest management activities are planned in this project area during the life of this plan. It is anticipated that construction clearing may be required in this area from time to time in support of the military mission.

5.8.2.6 Toandos Buffer Zone Project Area

Commercial Thinning in 20 acres of 60-year-old Douglas-fir in 2002 will open the stand to allow initiation of an understory, and will speed development of late successional habitat. Timber Stand Improvement of 15 acres of 20-year-old mixed stands in 2000 and 2003 will allow diversity manipulation while speeding development of selected trees and allowing the ground vegetation to continue to produce high quality browse.

6.0 Wildlife Management

This chapter of the INRMP attempts to address a wide range of issues. The intent is to achieve a stewardship program that highlights natural biodiversity and resource use, while providing best guidance for the military mission to continue uninterrupted. The INRMP addresses the policies and practices that eliminate or reduce conflicting wildlife and military mission goals.

The wildlife addressed in this plan includes all native and alien fauna known or suspected to occur at SUBASE Bangor, the Annex, Camp Wesley Harris and Toandos Buffer Zone, and their surrounding environments. Game, non-game, and nuisance species alike will be identified, and plans developed to address each. Problematic species will be addressed to reduce their impacts, while other species will be addressed with accepted management techniques to enhance or sustain their populations, as appropriate.

The wildlife component of this INRMP is to develop and maintain a series of natural wildlife habitats that will benefit native species. Additionally, the scope of the Plan will allow continued resources use, while limiting conflicts with the intended military mission sanctioned by the U.S. Congress and implemented by DOD. The Plan will present a cognitive approach to understanding the natural resources and practical programs for wildlife harvesting, observation, and recreation,

The purpose of this management plan is to integrate a set of goals designed to enhance outdoor recreation, and biodiversity of local ecosystems. In addition, recommendations for attainment of these objectives and goals are given, as well as general management recommendations.

The most important features of wildlife resources at SUBASE Bangor, the Annex, Camp Wesley Harris and the Toandos Buffer Zone are their composition and location in respect to other important regional natural resources. The wildlife composition is derived from the regional natural diversity that reflects a habitat defined by the marine climate as well as upland areas. This habitat allows for the presence of all mammalian species commonly found in Western Washington, as well as a great diversity in the bird species present. SUBASE enjoys a robust and diverse population of birds due its location on Hood canal.

There is a clear movement in wildlife management away from single species or total game species concentration, and towards management of resources in context of an ecosystem. This movement focuses on managing native wildlife as functioning set of habitat communities in order to benefit all native species capable of sustaining populations. This would also provide habitat important to many migrating and wintering species.

The ability of native wildlife species to sustain their populations within the Puget Sound area may be a concern. The loss of habitat has resulted in a decline of many species of animals, including reptiles, amphibians and neotropical migratory birds, in other words, the species diversity has suffered by the loss of this habitat. These concerns are exacerbated by the growing human population within the Kitsap County watershed. . Key issues become the sustaining of native populations of both common and rare wildlife, and the improvement of sustainable resource usage by personnel.

6.1 *Applicable Federal Laws, Regulations and Policies*

A series of Federal and state laws apply to the use and protection of native wildlife occurring at SUBASE Bangor (including the Annex, Camp Wesley Harris and Toandos Buffer Zone). These laws have been drafted to protect and sustain populations of common, threatened and endangered wildlife. The following table describes the applicable rules and regulations.

Table 9. LAWS AND REGULATIONS FOR WILDLIFE MANAGEMENT

Fish and Wildlife Coordination Act, as amended, Public Law 85-624, 16 USC 661 et seq.	This law was enacted to ensure that fish and wildlife conservation receives consideration equal to, and coordinated with, other features of water resources programs. Actions that would modify stream or water body require consultation with USFWS and Washington State Fish and Wildlife, as the Navy must give full consideration to the wildlife aspects of that action.
Sikes Act, as amended, Public Law 86-797, 16 USC 670(a) through (o)	This act requires Federal military installations with the adequate wildlife habitat to implement cooperative agreements with other agencies and develop long range wildlife management plans. This act also set guidelines for the collection of fees for the use of natural resources such as in hunting, fishing, and trapping.
NEPA of 1969, as amended, Public Law 91-190, 42 USC 4321 et seq.	NEPA requires projects with Federal funding to conform to all other Federal statutes governing natural resources impacts. NEPA requires environmental impact statements that address activities such as land development and their compliance with the standards of applicable Federal and state laws. Specifically, the Navy has an obligation to properly manage wildlife resources on all lands under their stewardship.
Fish and Wildlife Conservation Act, Public Law 96-366, 16 USC 2901 et seq.	This act provides for conservation, protection, restoration and propagation of non-game fish and wildlife species and their habitats.

Oil Pollution Prevention Act of 1990, Public Law 101-380	Redefines the requirements of the National Contingency Plan to include planning for, rescue of, minimization of injury to, and assessment of damages for injury to fish and wildlife resources. This Act extensively amended the Federal Water Pollution Control Act (33 USC 1301 et seq.)
Bald Eagle Protection Act, 16 USC 668 et seq.	http://www.fws.gov/r3pao/eagle/protect/laws.html Provides for the protection of bald and golden eagles.
Migratory Bird Treaty Act, 16 USC 703 et seq.	Protects migratory birds and their habitats, and establishes a permitting process for legal taking. Except as permitted, actions of the Navy may not result in pursuit, hunting, taking, capture, killing, possession, or transportation of any migratory bird, bird part, nest, or egg thereof.
Marine Mammal Protection Act, 16 USC 1361 et seq.	Protects marine mammals and their habitats, and establishes a marine mammal commission. Federal agencies must not take (i.e., harass or kill) any marine mammal on the high seas, or in waters or lands under U.S. jurisdiction.
OPNAVINST 6250.4, Pest Management Programs	
SUBASEINST 1710.7B, Hunting	Establishes rules for hunting at SUBASE. Defines the access list as well as the areas in which hunting is allowed. This instruction is updated annually.
SUBASEINST 1710.8B	This instruction provides a description of available fishing at the lakes, defines the open shellfish beach and explains the SUBASE fishing and Hunting permit process.

Washington State Fish and Wildlife regulations govern use anywhere within State boundaries. The Sikes Act requires that hunting and fishing programs on military lands be conducted in accordance with all State fish and wildlife laws and regulations. A cooperative agreement signed among the Department of Navy, USFWS, and Washington State Department of Fish and Wildlife details how the INRMP areas will manage wildlife. Harvesting of game is done in accordance with State regulations, including seasonal limits and bag limits.

6.2 Program Goals and Objectives

Wildlife management goals are:

- Minimize wildlife-related health risks, safety risks, and environmental damage.
- Support an optimal mix of multiple uses, both consumptive and non-consumptive.
- Employ a systematic approach to managing wildlife resources, utilizing a process that includes inventory, monitoring, modeling, management, assessment, and evaluation.
- Restore and maintain diverse wildlife where it does not conflict with the military mission.
- Maintain and involve partnerships with agencies and groups involved in wildlife management.

Above all else, human safety and welfare are top priorities. A tremendous amount of time and energy have already been devoted to programs associated with reducing operational safety impacts from wildlife.

In order to meet the goals specified above, the following objectives are established:

- Maintain game species populations that provide recreational harvest opportunities on a sustainable basis.

- Maintain wildlife levels that allow for robust, reproductively viable population levels that in addition, provide recreational viewing opportunities.
- Restore and support wildlife species natural habitats with native ecosystems.
- Develop a method for rapid storage, retrieval and manipulation of biological data.
- Maintain wildlife populations at or below carrying capacity to prevent damage to their habitats.
- Reduce or eliminate exotic or alien wildlife species.
- Reduce numbers of dangerous or nuisance wildlife.
- Afford special consideration of rare, threatened, and endangered species, as required by law.

The following areas on SUBASE Bangor have been identified as highly valuable to the needs of wildlife:

- wetlands
- stream corridors
- orchards
- mixed conifer/deciduous stands
- mature and/or old growth stands

Slash from harvest and TSI activities will be considered during project development. As feasible, it could be piled to provide habitat for small mammals, or chipped to open surrounding areas for understory release. In 1982, Raedeke and Tabor pointed to the destructive habitat pattern left by leaving slash scattered throughout a timber harvest area. They suggest that this material either be disposed of or at least piled in order to allow for the timely re-growth of understory species. Large Woody Debris (LWD) from construction sites, such as stumps and cull logs following construction clearing, can be moved to areas that are deficient of LWD and piled for habitat for small mammals, or placed in streams for fish habitat.

SUBASE Bangor streams are being surveyed to quantify woody debris. As woody debris deficits in the streams are revealed, projects will be developed to artificially place debris in them for habitat.

The greatest diversity of animals, including bear and cougar, occurs in the Bangor West Management Area. Threatened species, such as bald eagles roost along the shoreline, and marbled murrelets forage in Hood Canal. There are many small wetlands and streams that must be protected. The WDFW and the National Marine Fisheries Service (NMFS) recommend a 100-foot no harvest buffer around perennial streams and wetlands. INRMP management will comply with these recommendations. Bangor West will be managed with timber harvests to build structure and create small openings. Some construction is expected in the future with resultant openings.

Two of the opportunities Bangor West offers are for hunting and fishing. This area contains a varied forest mixed with conifers and hardwoods. There are four orchard areas left from the pre-Navy days. The salt-water beaches are an important recreation resource, they allow for saltwater fishing in accordance with State regulations, as well as recreational shellfish harvesting by both eligible participants and Tribal members.

Bangor East Management Area is an important habitat area and a preferred location for male deer. Though the area is fenced, deer easily cross it from the Bangor West Management Area. The optimal habitat includes a mixture of underbrush in the forest understory and open areas for feeding. Opportunities to improve habitat on current open areas include replacing current vegetation with a mix of species such as legumes, clover, current, thimbleberry, serviceberry, and native rose.

Bangor South Management Area is the area of housing and administrative support. The primary large wildlife species that will be managed through habitat development will be deer, as they are the most compatible with people. Bear and cougar, which visit this area, will be discouraged as opportunities exist.

No new non-native game species will be considered for release for hunting. In the past, Merriam Turkeys, Bullfrogs, Tinamou, and Chukar Partridge were released in accordance with State law and the cooperation of the WDFW. These species failed to establish viable populations at SUBASE, and the result of these experiments was that they were not viable. Emphasis will be given to native, established species.

6.3 *Inventorying and Monitoring*

The objectives for inventorying and monitoring ecosystems on SUBASE Bangor are as follows:

- Create and maintain a knowledge base of the natural resources; and
- Regularly monitor those resources that are important indicators of overall ecosystem integrity, the capability of lands to support the military mission, the status of imperiled species or communities, and other special interests.

An inventory is used to document the complexity, health and vigor of an ecosystem. The frequency and extent is often determined by disturbances to current forest stands by projects such as timber harvest and construction.

6.3.1 Flora Inventory and Monitoring

Forest inventories were completed in 1980 and in 1990. A forest inventory is planned again in FY2000. The inventory is to include an understory shrub description for each tree stand.

Johnson Controls completed a SUBASE Bangor wetland report in 1992 and at Camp Wesley Harris in 1993. These wetland reports include maps and lists of vegetation species found at the site.

The Washington Natural Heritage Program of the Washington State Department of Natural Resources conducted a natural biological diversity survey in 1995. The purpose of the inventory was to locate and describe rare plant species and significant terrestrial native plant communities and wetlands on SUBASE Bangor and Camp Wesley Harris. No Threatened, Endangered, or Sensitive plant species were located during the inventory work.

6.4 Wildlife Five Year Plans

Scheduled inventory and monitoring projects to be accomplished during the next five years include:

- Forest Inventory, including understory vegetation, with the deliverable product in September of 2000.
- Bear Study (to be completed in year 2000).
- Deer Contraceptive Study (to be completed in year 2000).
- Devils Hole Watershed Study (to be completed in year 2004).
- Inventory habitat development projects before and after harvest (ongoing).
- Fur bearer population census (to begin in 2000).
- Bird surveys with Audubon to be conducted quarterly.
- Wetland plant monitoring for restoration needs (ongoing).
- Oyster and clam population census (biannually).
- Aquifer water levels are monitored quarterly.
- The water supply aquifer is monitored for seawater intrusion.
- Monitoring of habitat improvement following forestry activities (on a project basis).
- Stream surveys for habitat conditions (quarterly).
- Cougar census (to be planned with WDFW).
- Camp Wesley Harris and Toandos wildlife surveys.

6.5 Terrestrial Habitats

Upland Forest Types: This habitat consists of a reasonably dry area containing Douglas-fir and western hemlock with a sword fern and salal understory. These habitats vary in age and understory composition dependent upon when the last timber harvest took place. Important for thermo regulation for deer, providing nesting habitat for birds, and dependent upon downed large woody debris, this area affords living areas for varied small mammal species.

Upland Successional Habitats: These are habitats that are strictly defined by age of the timber stand. These stands are recently cut over stands having the understory impacted by the harvest operation. Having the canopy opened, allows for sunlight to reach previously shaded forest floor, changing the understory composition from shade tolerant to sun species. Native blackberry, trailing blackberry, thimbleberry, orchard grass, and fescue make up the species list in these areas. Vital for wildlife as they produce forage species not previously found here, and are areas of dramatic change, hence the small mammal population surges followed closely by the predators, coyotes, fox, bobcat, and various hawks and owls.

Grasslands and Shrublands: SUBASE contains many diverse grassland habitats. Some of these areas were left as remnants of pasture/orchard operations by inhabitants prior to the Navy's purchase of the property in the 1940s'. Other grassland areas were created as a result of mitigation taken as a part of the Industrial Restoration Program. This program is involved with cleaning up and mitigating past hazardous waste sites. In areas where the mitigation involved was very intrusive, the area was graded and planted with native grasses. One area received soils that had been cleaned via the composting process. These soils, highly enriched with fecal fertilizer and vegetable additives, were planted with native grass species. These grasslands occur

in outlying, non-industrial areas and are only mechanically treated for the removal of Scots Broom.

Orchards: Orchards left by early settlers on the SUBASE Bangor site are important habitat for wildlife and also provide recreational harvest by some Bangor residents. During a cultural resource survey it was suggested that these may have originated from original stock brought to this country and that preservation of the genetic stock could have value. The orchards are valuable as wildlife habitat.

A 25-foot selective timber harvest buffer will be maintained around the orchards. Rehabilitation of the orchards can help offer habitat benefits into the future.

6.6 Wetland Habitat Types

Deciduous Forested Wetlands: These wetland areas consist of wetland plants with an important component being large deciduous trees, usually Red Alder. The trees provide shade keeping water temperatures cool, and supplying a rich organic food source as they shed their leaves. As the wetland rises and falls, some of the trees are killed by having the root zones inundated with water. These trees quickly rot, providing homes for cavity nesters, food for insect foragers, and after they have fallen into the wetland, additional organic matter from which the other existing wetland plants feed.

Coniferous Forested Wetlands: These wetlands have Douglas-fir and lodgepole pine in close proximity to their edge. The waters are usually somewhat acidic and brackish in color. Acidic plants such as hardhack, reed canary grass, and water lilies make up this community. Again the trees are an important component as they provide a temperature regulation as well as providing necessary large woody debris as they decay and fall to the surrounding area.

Shrub Dominated Wetlands: These wetlands are peat bogs in origin, contain hardhack, serviceberry, skunk cabbage, and cattails. They are open and provide easy access for waterfowl species. Due to the lack of canopy cover, they are warmer than other types of wetlands and therefore provide habitat for the more water dependent life cycles of herpetillian species.

6.7 Aquatic Habitat Types

Saltwater Habitats: An eelgrass survey was completed in 1979 as part of the Trident EIS. An additional survey was completed in 1984 as required by the Hydraulic Permit Approval issued by the WDFW granting permission to dredge the Keyport Bangor Dock area. In 1991 there was an eelgrass study by the Washington Cooperative Fish and Wildlife Research Unit of the University of Washington. The purpose of the study was to determine if eelgrass transplantation in the intertidal zone is a viable tool for mitigation of dredging. They concluded that the transplantation did not work, and that dredging operations avoid the lower intertidal zone and large eelgrass beds.

6.8 Threatened and Endangered Species and Sensitive Area Management

SUBASE Bangor has four federally listed threatened species: the bald eagle, marbled murrelet, Puget Sound chinook salmon, and Hood Canal summer run chum salmon. The marbled murrelet feeds in the marine waters of Hood Canal. SUBASE Bangor does not contain marbled murrelet nesting habitat, though there may be unidentified habitat in the Toandos management area. Spotted owls are found in nearby northwest forests but no nesting or dispersal habitat has been identified on SUBASE INRMP management areas. Identified nests of ESA species will have a 100-foot no-harvest buffer.

Hood Canal summer run chum salmon and Puget Sound chinook salmon were listed as threatened by the NMFS in March 1999. All activities, construction or maintenance, occurs only with permission of WDFW through the Hydraulic Permit Application (HPA) process. All projects are subject to a Biological Evaluation and consultation with NMFS.

Six potential great blue heron rookeries have been located on SUBASE Bangor. These must be considered and protected during planning of other projects. They will have a 100-foot no-harvest buffer.

There are four active osprey nests that have fledged young for the last 15 years. These will be protected with project planning. They will have a 100-foot no-harvest buffer.

A survey of SUBASE Bangor for amphibians was conducted during the summer of 1995. No upland surveys were conducted. Native species detected were northwest salamanders, long-toed salamanders, rough-skinned newts, red-legged frogs, and pacific tree frogs. The introduced bullfrog was also detected. Some of the wetlands exhibit the highest species richness on the Kitsap Peninsula. None of the amphibians detected on SUBASE Bangor are listed by State or Federal governments as threatened.

6.9 Status of Habitats and Associated Species Groups

Forested Habitat: SUBASE has various components of Forest Habitats. These habitats vary in complexity as a function of age. As the forest matures, the canopy closes allowing less light to reach the ground. The result is an understory comprised of one or two species, mostly shade tolerant such as sword fern. SUBASE forests range in age from newly established to mature second growth. Our forests have been managed in a monoculture fashion with Douglas-fir being the favored species. This has allowed little diversity and the structure of the forest has not allowed for early successional species to rise and fall naturally creating openings which allow for a varied understory. It is the intent of this plan to manipulate these stands to the benefit of wildlife species. Areas in the North End of SUBASE will be set aside to eventually become old growth stands. Mature sites will be cut to introduce a diversity of species as well as a diverse age structure within this forest. Trees will be harvested but small trees as well as older trees will be left. When the area is re-planted, this forest will have varied age classes of trees. Hardwood species as well as conifers will be planted in order to increase the diversity even further. As they now stand, these habitats offer shelter from storm events and cover areas in which animals avoid predators.

Open Habitats: These are habitats in which the trees are scattered throughout the area allowing sunlight to reach the forest floor. Plant species become more varied as a result and consist of various grasses, blackberry, thimbleberry, horsetail, and both perennial and annual flowered plants. This allows for many animals and birds to gather food. All species from small mammals to large mammals, seed eating birds as well as insectivores, gather in this habitat as well as those species that predate upon these species.

Intertidal Habitats: These areas are some of the most diverse habitats within the boundaries of SUBASE. They are highly diverse in both plant and animal species. The tides both flush and feed this system bring in nutrient from elsewhere in the marine system as well as providing the vehicle by which reproductive material is exchanged, i.e., seeds, oyster and clam spat, crab and snail eggs, etc. This area also contains eelgrass beds, which are vital to the survival of summer-run chum salmon smolt. This species was added to the Endangered Species List as a “threatened” species in 1999.

6.10 *Proposed Management and Conservation Measures*

6.10.1 Habitat Management

Manipulation of Vegetation Succession: In order for habitats to be viable for both fish and wildlife species, it is important that the structure of these areas be varied in age and composition. To this end, the Natural Resource Program will manipulate existing habitats in order to arrive at the desired state. Closed canopied timber stands will be opened to encourage understory growth. Mature stands will be harvested in such a fashion as to leave all trees larger than a target diameter and to also leave trees under a target diameter. This maneuver will allow for immediate variation in age structure when planted with seedlings. Hardwood species as well as native understory plants will be added to these areas.

Areas on the North End of SUBASE will be allowed to become old growth habitats. Timber harvests will not take place in these areas. The end result will be a greater variation and diversity both within a stand and among stands.

Wildlife Plantings: Fish and Wildlife will continue to plant tree and shrub species throughout the base. Reclamation of areas over grown with Scots broom is the prime candidates for this kind of manipulation. Species utilized in this program are as follows: Washington thorn, vine maple, hazelnut, native apple, native cherry, red currant, thimble berry, service berry, red and white clover, and various grass species.

Artificial Nesting Structures: Natural resources personnel will continue to install perch poles, nest boxes, and brush piles to encourage both bird and small mammal species to inhabit these areas. Perch poles have allowed raptors to nest and hunt. The increase in the small mammal population has allowed them to hunt successfully. Wood Duck boxes placed at Cattail Lake has encouraged this species to breed successfully. Snags are retained throughout the forest. New snags have been created. This program has resulted in an increase of cavity nesting species, especially the Pileated Woodpecker, a listed species on the State of Washington’s Sensitive Species List.

6.10.2 Species Management

6.10.2.1 Game Species

Deer: During the years 1982,1983, the initial deer study was completed for SUBASE, Bangor. The population was estimated using two different methods, mark/recapture analysis, (Begon, 1970), and the partial removal method, also known as the dichotomy method. (Chapman, 1955; Richer, 1975) Collaring forty-two animals throughout SUBASE completed the mark/recapture method. An exception to this was that no animals were captured north of Darter road due to limited access. A total of 24 separate spotlight night counts were completed specifically to estimate deer numbers. The estimate derived was for all of SUBASE south of Darter road. This census resulted in a post harvest deer population estimate of 253 animals + or – 18.9 deer at the 95% confidence level. Using this same method, population estimates for the three distinct areas of SUBASE were determined as follows: Operational area 158 deer, Housing/Industrial area 27 deer, and NUWC Annex 67 deer. It was assumed that the deer population in the north end, where no animals were tagged, was at the same density as the rest of the wooded area in the operational area. The Operational area had an estimated population of 158 animals residing in 2,043.6 acres of forest land resulting in a deer density of 0.077 deer/acre. The north end has 748.4 acres of land; simple multiplication resulted in an estimate for this area being 58 deer. When this figure was added to the estimate for the rest of the base, the resulting overall estimate was 311 deer, + or – 19 deer. An interesting result of this portion of the study was the discovery that the female deer had a home range of about ¼ square mile and it seemed that regardless of what happened within that habitat, they adjusted and stayed within those boundaries.

The partial removal method, an estimate made by knowing the herd composition prior to harvest, the composition of the harvest, and the composition post-harvest, resulted in an estimate of 435 deer for the entire base being composed of 328 females and 107 males. The 95% confidence levels were 462-408. While the estimates differed somewhat, they were comparable for males but differed for females. This was probably due to the fact that only males were removed from the population via hunting. Also, the fact that tagged animals are only seen occasionally and females remain within small defined territories led the researchers, Tabor and Raedeke, to believe that the estimate derived from the mark recapture study to be an absolute minimum. The estimate of 35-deer/square mile was well within the estimates of Brown, 1961, which projected deer densities throughout Western Washington to be 39-deer/square mile. Therefore, the estimate derived through the partial removal method of 435 deer was taken as the more realistic estimate.

During the years from 1984 through 1994, SUBASE averaged 31 deer killed by vehicles and 19 deer taken by hunters annually. The only year that the hunting harvest exceeded the vehicle kill was in 1983, when hunters harvested 54 deer.

In 1995, it was decided that SUBASE would again duplicate the mark/recapture project in order to establish the following data points: 1. Obtain a current population estimate, and 2. Having to manage the deer in the non-hunttable area, housing, it was important to define home ranges for female deer. Other factors that led to this conclusion were that vehicle kills were rising sharply in the housing area, and the new housing additions were complete resulting in an 82-acre loss of habitat. The study was designed to answer these questions by tagging a portion of the population

and tagging females in each area with a different colored tag. Yellow tags were used in the operational area, white in the NUWC annex, and blue tags in the housing area. Two discoveries were made: 1. Only one doe was found outside the area in which it was tagged, yellow-23 was found in the annex but this was well within the ¼ mile home range defined by Raedeke in 1983, and a disproportionate number of males were found in the annex. Out of the 11 chances to tag animals in the annex, 10 of these opportunities were male deer. When the study was completed in May of 1995, these animals were distributed throughout the base. Subsequent studies have shown that males after the rut gather communally in the annex. This area is important habitat for males. Thirty-seven animals were tagged for this study and a total of eight night spotlight counts completed. The population was estimated at 367 animals with the confidence limits being 385-349. This study indicated a decline in the population from levels estimated in 1983. The home range data received from this study was instrumental in SUBASE obtaining two permits from the Federal Drug Administration to use contraceptives in deer in the housing area. The contraceptives used were Norgestament, 1996, and Porcine Zona Progesterone in 1998. These medications were used in the Housing area to attempt to manage the deer population in this non-hunting area.

The Norgestament study took place in 1996 with the assistance of Dr. Darrel J. Kessler of the University of Illinois and Antech Laboratories. The drug was administered via a cellulose bio-bullet shot from a .25 caliber air rifle. Eight females were inoculated in September of that year. One animal was killed by a vehicle in December of 1996, five had offspring the following spring. It was determined that the delivery method for this medication was ineffective in the heavy understory habitats at SUBASE. It was difficult to maneuver an animal into position for a shot, and when a shot was possible, it was very difficult to determine whether or not the bio-bullet had penetrated to the necessary depth of 4 cm.

PZP was used in this same population in October of 1998. Nine animals were tranquilized and while down; they were inoculated with 3 cc of the contraceptive. Five of the treated animals were also given 3 time release pellets by inoculation. The remaining four deer were boosted via a 1 cc pneu-dart loaded with the liquid PZP. One of these study animals was also hit and killed by a vehicle shortly after being treated. Four of the remaining doe have had offspring in the spring of 1999. Due to the ability of deer to recycle estrus cycles, the monitoring portion of this study will not be complete until September of this year.

Currently, SUBASE is working with the WDFW and the Port Hadlock Detachment to determine a cause and a possible treatment for the “Hair loss Syndrome” currently affecting the deer at both installations. This is a condition in which the deer lose a major portion of the hair on their body. The exposed skin becomes infested with lice. The over-all condition of the deer is severely degraded over time and they eventually die of verminous pneumonia. Necropsies of these animals show a tremendous internal parasite load including lungworms, heartworms, liver flukes, flesh worms, and kidney lesions. SUBASE has had 11 known deaths due this condition in 1999. As a result, access for 1999 hunting was denied by the Commanding Officer. Future management plans are as follows:

- Complete the PZP study in 1999.

- Continue the cooperative study project with the Port Hadlock Detachment and the WDFW.
- Repeat the mark/recapture study in the year 2002 to determine long lasting effect of the Hair Loss Syndrome.

Deer population inventories were accomplished in 1983 and 1995. It is planned to inventory again in 2002. Transects for monitoring deer populations for 16 years indicate deer populations have dropped significantly.

Black tail deer are numerous on SUBASE Bangor. This population is continually monitored for population levels, health, gender composition, and habitat use.

6.10.2.2 Non-Game Species

Black Bear: SUBASE saw a dramatic increase in the number of bear sightings during the years from 1994 through 1998. This increase was from five sightings in 1994 to 63 in 1998. In order to have confidence in the sightings, the sightings were only recorded from personnel attached to SUBASE Security and the Marine Security Force Company. It was these two organizations that made the initial observations in 1994. Keeping the observers the same and recording only sightings made at least one hour apart and a distance greater than two miles apart, This allowed for us to avoid recording multiple sightings in the same area over a short period of time by many individuals. While it did not allow us to distinguish individual bear, it did allow us to plot the increase of activity. The increase in sightings coupled with variation in location indicated that the population was in fact increasing in frequency at SUBASE.

Drs. Kohler and Hall, along with Dr. Ericson assisted SUBASE with establishing trapping protocols. We were able to capture three Black bear, two animals twice, and fit them with radio collars. Tracking these animals showed that they used the entire base and moved off base at will. Tagged bear were found as far away as Kingston, WA. a distance of 19 miles. Animals were also found south of the base in Seabeck, a distance of 7.5 miles. Data from this effort also showed that these tagged bear, all males, utilized the habitat at SUBASE during the early spring and fall. Other times of the year were spent off base.

In addition to collaring captured animals, we collected both fecal and hair samples wherever available. Fecal samples were found in areas in which traps were set as a function of walking to and from the trap site. Hair samples were found in the barbed wire that is incorporated into the SUBASE Security fences. Hair, blood, and fecal samples were also taken from all captured bear. These samples were sent to the Wildlife Laboratory at the University of Washington, and with the assistance of Dr. Sam Wasser, DNA analysis was performed. This analysis identified twelve distinct bear, three females and nine males. Two of the males were directly related either as father/son or brothers.

It is important for the protection of this species that reproductive efforts are identified and any existing den site is protected. To this end, the study will continue through the end of the year 2000, with efforts directed at capturing and collaring female black bear.

It is desired to manage habitat to decrease bear use around the community centers and housing. Food plants which might draw bears, such as berries, will preferably not be planted in managed stands around housing in the Bangor South Management Area. Planting preferred food plants in less inhabited areas for bear forage is encouraged.

Cougar, or Mountain Lion, have been seen throughout SUBASE. We have had nine sightings in 1998 and six sightings through July of 1999. Natural Resources personnel have also noted other cat sign such as scratching posts, deer kills, track, and on one occasion, found a hard ball sized hairball. We have also found hair caught in the boundary fence barbed wire. The hair samples together with a sample from the hairball were sent to Dr. Sam Wasser at the U. of W. Wildlife Lab. for DNA analysis. This analysis discovered that two distinct animals, both males, had used this area to move on or off SUBASE. In March of 1999, Natural Resources personnel sighted an adult lion with a cub in the NUWC Annex. The most effective method to capture cougars is with the use of hounds. This is an option open to SUBASE for the purpose of capturing an animal and removing it to some more remote location. There is a concern for the safety of base personnel. Sightings are reported via the base newspaper, *The Trident Tides*, and special notices are sent to all residents of housing advising them of the precautions to be taken. SUBASE is currently working with the WDFW to determine the best course of action to be taken with regards to this species. Management decisions will be made with input from this agency.

The potential for conflict between cougar and humans is a concern for managers at SUBASE Bangor. A population survey will need to be conducted to help make the decision of how to manage this population. Cougar prey on deer, which are numerous, but decreasing on SUBASE Bangor. Deer are common in the southern portion of the SUBASE that has more open habitat, but with buildings and people, and this may be their main attraction. Unfortunately, cougar are very adaptable and may also be foraging for domestic house cats and small dogs, as well as other small wild animals.

Fur Bearing Mammals such as beaver, river otter, ermine, coyote, raccoon, fox and bobcat reside on the INRMP-managed lands. These are not currently being trapped or hunted. A survey is planned to determine population levels and needs for management. This survey is necessary not only for management purposes, but to determine relationships with and impacts upon other species present

Other Species: A Christmas Bird Count is done annually on SUBASE Bangor by the Kitsap County Chapter of the Audubon Society. In 1998, 57 species were inventoried.

6.10.2.3 Threatened and Endangered Species

Federal

SUBASE Bangor has two listed bird species that utilize this habitat. They are the marbled murrelet and the bald eagle. Surveys are completed annually by WDFW to document bald eagle productivity on Hood Canal. Eagles have been observed feeding, roosting, and bathing in areas within SUBASE boundaries. No known nests occur on SUBASE, however 4 nests have been identified and monitored on the Toandos management area. (Ament, 1998).

Marbled murrelets have been identified on the Canal adjacent to the Delta Pier (K. Livesey) but no nest sites have been discovered.

Hood Canal is also home to two listed species of salmon, chinook, (king salmon), and summer-run chum salmon. Chinook have occurred in the recent past within the streams that feed Devils Hole, P. Topping, pers. comm. Summer-run chum migrates through the tidal waters of SUBASE. No chum has been found in SUBASE streams. Chum salmon have been documented in the streams located on the Toandos Peninsula property, D. Smith, 1997.

SUBASE, Bangor, contains no known State or Federally listed mammalian species.

There are four active bald eagle nests in the Toandos Management Area, and eagles roost periodically on SUBASE Bangor. Bald eagle populations in the State are increasing, and these increased numbers of birds are moving into new territories for both nesting sites and foraging ranges. Bald eagles will be protected on the SUBASE and its managed areas. This protection encompasses trees along the shoreline that the birds may use for perching and trees that may be used for nesting in the near future.

State

SUBASE has two species that are listed on the Washington State Sensitive Species list, the great blue heron and the pileated woodpecker. During a survey in January of 1999, six potential great blue heron nesting sites were found. These sites still have the remnants of nesting activity that has taken place over the years. The areas will be resurveyed to determine whether they are still being used. If rookeries are established, these areas will be protected.

The great blue heron and the pileated woodpecker are listed on the Washington State Sensitive Species List. Identified nests will have a 100-foot no-harvest buffer during forestry or wildlife habitat development activities.

Pileated woodpeckers are cavity nesters that use snags and existing cavities. Several nest sites have been found. It is the policy to leave snags that can be left safely during forestry operations. Snags are a component of most stands as a result of fungus and insect activity. If snags are not a component of stands they will be created as part of forestry or wildlife habitat projects. Pileated nests will be mapped as a portion of the bird surveys slated for completion within this document.

6.10.2.4 Avian Management

SUBASE Bangor provides habitat for over 100 species of birds. Habitat increase and improvement is desired for late-successional habitat utilizing species. This will require stands of mixed coniferous and deciduous trees, various sizes and species of shrubs, and various stages of snag decomposition. Early-successional habitat is abundant around the community center and housing of SUBASE and in surrounding Kitsap County.

Neotropical birds pass through SUBASE Bangor managed lands on their annual migrations. A variety of habitats within the region will help to maintain them during periods of use.

There are four active osprey nests on the INRMP management areas. These nest trees will be protected with a 100-foot no-harvest buffer.

6.10.2.5 Nuisances and Problem Wildlife

Geese:

In 1997, the Strategic Weapons facility Pacific, (SWFPAC), Security and Operations Department reported that there were in excess of 300 geese in the Main Limited Area, (MLA). This large concentration of birds was becoming a nuisance to the daily operations of this area as well as a threat to human health and safety. The birds setting off intrusion alarms as they grazed impacted operations in this high security area. This resulted in a full alert response by the Marine Security Force Company. Individuals were impacted when they took defensive positions. This effort forced them into direct contact with fecal material left behind by the geese. Under the authority given by a permit issued by the USFWS, we began to addle eggs with corn oil. We addled 43 nests containing 173 eggs and were successful in preventing all of the eggs from hatching. In 1998, it was not possible repeat this process due to security needs. Geese were captured and euthanized. The adult carcasses were given to local charities. A more effective less intrusive method is scheduled in the year 2000. SUBASE will use border collie dogs to harass the geese, forcing them to nest elsewhere. This method was suggested and approved by the wildlife Services Division of the U.S. Department of Agriculture.

SUBASE will monitor geese populations on Bangor and take corrective actions when their numbers impact the military mission.

Deer/Auto Hazards Reduction:

Deer/auto collisions have been steadily increasing on base. We have averaged 27 vehicle-kills/year since 1983. There has only been one occasion in which the hunter harvest has exceeded the vehicle kill in this entire time. Most of these accidents occur within the housing areas. These are areas in which hunting is not allowed; therefore this population has no other controlling mechanism. As previously stated, we are attempting to use contraceptives to control this population there by reducing the probability of such accidents.

Other Bird Problems:

European Starlings and Pigeons (Rock Doves) have proven themselves to be pest species. They are not protected by the Migratory Bird Act and as such may be controlled by humane means. Netting and "Bird Away" have been used to control pigeons at the Explosive Handling Wharf where the birds themselves and their fecal material have impacted the overhead cranes. Starlings have attempted to nest in the security lock boxes inside the Main Limited Area, the highest security area at SUBASE. These nests are routinely destroyed when found. Periodically, there have been attempts by crows, Ravens, and Osprey to nest at the top of seldom used cranes. The nests have been destroyed prior to having eggs, with the permission of the USFWS.

6.10.3 Integrated Pest Management:

SUBASE has an Integrated Pest Management Plan that is approved by Naval Facilities Engineering Command and by the Navy disease Vector Ecology Control Center. Pest control is accomplished by State certified applicators and is overseen by a DOD Certified Pest Control Coordinator.

6.10.4 Rabies, Hantavirus Disease Threats:

There have been three incidents of rabies at SUBASE. In 1992 and again in 1994, bats were found to have tested positive for this disease. In 1995, a cat that had caught a bat also tested positive for rabies. Bats are discouraged from nesting in the housing area and periodic

newsletters to the residents are sent out advising them of the low possibility of this species being a potential carrier of the virus.

In 1996 and 1997, personnel from the Disease Vector Ecology Control Center in Poulsbo, Washington, completed a small mammal survey whose intent was to detect Hantavirus in small mammals. Two *Peromyscus maniculatus* were found to be positive for this disease. Since that time, SUBASE has operated under the assumption that all rodents would be considered carriers. Fecal piles and nests of these species are treated with chlorine bleach before removal by qualified pest control personnel.

6.10.5 Hunting Program

Deer hunting is a desired recreational pursuit within bounds of State hunting restrictions, State licenses, SUBASE Bangor recreational permits, and security and personnel safety considerations.

6.10.6 Enforcement Activities

SUBASE Bangor has a game warden system based on cooperation between its Law Enforcement Activity (LEA) and the Washington State Department of Fish and Wildlife (WDFW). Both agencies enforce the Washington Fish and Game Code and agreements. LEA currently has a full time game warden. He works cooperatively with SUBASE Bangor security, and WDFW. SUBASE Bangor has exclusive federal jurisdiction (Exception Sikes Act). LEA personnel and WDFW wardens with federal commissions have the authority to apprehend and cite violators.

Traffic violation tickets (Citation Form 1408) are usually written for fish and game violations. The LEA citations are processed through the SUBASE Security and Legal divisions. LEA citations are processed on SUBASE Bangor through the Legal division, the same as traffic violations. LEA recommends actions to the Legal division. By direction of the Commanding Officer, the Legal division then has the authority to revoke hunting, fishing, shell fishing privileges, or base access for violators abusing SUBASE Bangor regulations or of any state or federal laws. The WDFW agents issue state citations. The State citations are processed through the County Prosecutor's Office.

The Natural Resources Law Enforcement Program focuses on prevention and enforcement to obtain compliance of the applicable laws. Emphasis is on education and community support of bag limits and seasons. Game laws are enforced in accordance with applicable State and Federal laws.

Consultation with NMFS and/or USFW will occur when it has been determined that a particular project will cause an adverse impact, or the project is likely to cause an adverse impact to the listed species. If it is determined that no impact will occur, or that the impact is insignificant, a formal consultation is not required. All projects are subject to a Biological Assessment.

6.11 Additional Research Needs and Monitoring

The projects listed in this section are based on baseline data gaps for ecosystem monitoring and prioritized projects to manage the fish and wildlife in accordance with the Sikes Act. Due to distinct ecosystems of SUBASE Bangor, Camp Wesley Harris and Toandos Peninsula, data gaps and prioritized project lists are provided for each installation.

Nature has not provided an ecosystem with rigid guidelines for boundary demarcation. Ecological systems vary continuously along complex gradients spatially and they are constantly changing with time. Recognizing that ecosystem functioning includes inputs, outputs, and cycling of materials and energy, as well as the interactions of organisms, ecosystem scientists Define ecosystem boundaries operationally so as to most easily monitor, study, or manipulate these processes.

It is the intent of the following projects to promote an atmosphere in which individuals work as a team to attempt to understand the varying components of the SUBASE Bangor ecosystem and how it affects the greater ecosystem surrounding it. The following projects will be used to monitor the ecosystem.

Since the listing of the chinook and summer run chum salmon to the Endangered Species Act (ESA) list, all proposed forestry and construction projects will be reviewed for biological assessment need by the Wildlife Biologist. It is mandatory under the ESA that all projects that may pose an actual or potential impact to the listed species habitat are assessed, and the impacts eliminated, reduced, or mitigated. If these projects impact the salmon habitat, then it is necessary to enter the formal consultation process with the National Marine Fisheries Service. These assessments are considered routine and no additional funds are projected for this task. Costs for formal consultation or impact mitigation will be borne by the project.

6.11.1 SUBASE Bangor and the Annex

SUBASE Bangor and the Annex are contiguous property and the projects listed will include both.

6.11.1.1 Research and Special Projects

- **Deer Contraceptives:** A contraceptive study is in progress on deer on SUBASE Bangor to determine if it is possible to use contraceptives in deer to limit reproduction in overpopulated areas. This is in cooperation with the United States Humane Society and Zoo Montana. The SUBASE Bangor biologist and staff are doing the study. Collected specimens are sent to veterinary schools at the University of California – Davis, University of Georgia, Washington State University, and Oregon State University for analysis.
- **Hair Loss Syndrome:** A study is being done with Washington State University and Washington State Department of Fish and Wildlife to determine causes and treatments of a “black-tailed deer hair loss syndrome” which has killed a number of deer in Western Washington. The deer hair loss project has sent deer to the Washington State University

campus for study. In addition to searching for causal agents, medication placed in salt blocks in the field is being analyzed for effectiveness.

- **Habitat Development:** A variety of tree cutting intensities and patterns will be tried over the next five years to improve the skills in creating desired wildlife habitat conditions.
- **Cougar Habitat:** A study to determine habitat use by cougar will be accomplished within the next five years.

6.11.1.2 Small Mammals Surveys:

Small mammals, such as deer mice, squirrels, and wood rats, mountain beaver, bats, and rabbits, are the species that provide the prey base for higher orders of birds and mammals such as, hawks, owls, coyotes, and bobcat. These species are usually robust in number, somewhat cyclic, and utilize small habitats. As an integral part of the SUBASE Bangor Forest Practices, all proposed timber harvest will be surveyed for the presence or absence of small mammal species. These sites will be surveyed prior to and within one year of completion of the timber harvest. Data gathered will provide information that may be used in the planning process of future timber harvests. As this task is currently a routine assignment within the Wildlife Biologist's job description, the need for outside funding is not anticipated.

NOTE: Hantavirus has been identified to be present in small mammals at SUBASE. Surveyors will use the following precautions when trapping these species:

- Use rubber gloves.
- Wear a medical respirator.

Methodology: Small mammal surveys will be conducted by laying a numbered grid over the map of a proposed timber harvest area. Transect starting points will be established through a random drawing of grid line numbers. The length of each transect will be 100 meters with no transects being closer than 50 meters. The number of transects will be sufficient to cover the proposed timber harvest area. Trap stations will be established every 20 meters along each transect and each station will accommodate 2 traps; 1 shadow box trap and 1 Museum Special snap-trap. These traps will be baited with peanut butter and oatmeal and checked for capture every day for a period of three days. The timber harvest area will be surveyed prior to harvest and within one year of the completion of the harvest. Accrued data may be used to design future harvest cuts.

6.11.1.3 Baseline Data Gap Projects

Data gaps to determine the health of the ecosystem have been identified and are necessary to provide SUBASE Bangor with information to maintain the diversity defined by these studies.

- ***Regional Forest Inventory, including under story species:***
SUBASE Bangor will inventory the forest and include understory species. This data will be linked with existing geologic data, wetland survey data, and riparian data along with degree of canopy closure to determine habitat types that currently exist at SUBASE

Bangor. This knowledge will then allow development of highly favored habitat. This project will be funded through Forestry Funds.

- ***Fur Bearers:***

SUBASE Bangor will complete a base-line survey for these species in the years 2000 and 2001. This group is somewhat further defined as skunks, beaver, otter, mink, and weasels. These are species expected to be present on SUBASE Bangor. This study will define species present, habitat in which they are found, and area of concentration. In-house staff will complete the project and the estimated costs of materials needed are \$10,000.00. These funds will be applied for through the CINCPACFLT Environmental Compliance Office.

Methodology: This survey will be accomplished using smoked track plates placed at baited stations located throughout SUBASE Bangor (Greg Shirato, WDFW). Once track count data has indicated presence of a species, Hav-A-Heart traps will be located at the site to attempt to capture representative samples of each species. Trapped animals will have a Sono-tag attached and their movement charted for the period of one year. Data from this study will provide a baseline survey for these species and define home ranges and habitat needs of these species.

- **Birds.**

This survey will be coordinated with the Kitsap Audubon Society or another comparable group. Surveys at SUBASE Bangor will be conducted in the spring and fall of the year 2000. The resulting data will be combined with forthcoming and existing Christmas Bird count data to provide SUBASE with a comprehensive list of species present. It is expected that during the spring counts, some nests will be found and impacts to those areas will be avoided. The cost of this project is estimated at \$25,000.00 and funding will be applied for through the CINCPACFLT Environmental Funding Office.

Methodology: Qualified observers who have practical experience using the Point Count method will conduct the bird surveys. The observers must also be able to identify birds by sight and sound within 50 meters of a particular point station. A 100-meter grid will be placed over map of SUBASE Bangor and the opposing grid lines numbered. Point coordinates will then be assigned by random drawing with no two points being closer than 150 meters. Counts will be made in the spring and fall of the designated year and gathered data will be added to existing Christmas Bird Count Data to establish bird species diversity.

6.11.1.4 Continuing Management Projects

- **Black Bear Study:**

During the years of 1994 through 1998, SUBASE saw a dramatic increase in the number of Black Bear sightings. This increase was from 5 sightings in 1994 to 63 sightings in 1998. A study was designed with assistance from the University of Washington and WDFW to determine the following:

- Determine the length of time any individual resides at SUBASE Bangor.

- Determine population parameters; such reproduction, mortality, habitat needs.
- Determine relatedness of individuals within this population.

Methodology: The study includes two distinct methods of determining population and gender of these animals. One method is to capture bear in a foot snare trap and fit it with a radio collar and the other is to extract DNA from hair and fecal samples. Four bear were captured and collared and their movements were recorded through Kitsap County. Twenty hair and fecal samples were sent to the University of Washington for DNA analysis. Twelve distinct animals were identified, nine males and three females. All of the captured were male. Females are extremely difficult to capture (Kohler, Shirato, Ericson and others.) It is important that an attempt is made to capture one or more females in order to determine whether or not denning or birth is taking place at SUBASE Bangor. This is an ongoing project and will be completed in the fall of 2000. No additional funds are anticipated to be needed.

- **Devils Hole Watershed Study:**

This watershed consists of approximately 4.5 miles of streams that discharge into Devils Hole Lake and eventually to the Hood Canal via a fish ladder. This lake is used for recreational fishing. Until 1982, it was stocked annually with rainbow trout that were obtained from the USFWS hatchery at Quilcene. Since that time, it has received a single planting of trout in 1995. From 1983 until 1990, this watershed was used to re-introduce Coho salmon into the streams. The purpose was to attempt to re-establish this anadromous fish run that was terminated during the 1940's when the Navy built a road that effectively blocked the stream to fish passage. A total of 940,000 salmon were raised from eggs obtained from the USFWS hatchery at Quilcene. The resulting fry were raised to a weight of 100/lb and then released at various spots along the streams. These fish remained in the system for approximately 14 months at which time they migrated to the salt water of Hood Canal. Adults from this effort returned to the system in the fall of the year, the first arriving in 1986. During the years 1986 through 1992, SUBASE Bangor averaged 140 adult returning to the lake. This project design was to establish the population through out plants and allow it to become self-sustaining over time. In 1990, the Point No Point Treaty Council, the USFWS, and WDFW, agreed that it was time to determine whether or not these goals had been met. It was also decided to cease the supplemental plantings. We received good returns from 1993 through 1996, with the suggested quota of fifty spawning pair being met each year. Since that time, we have experienced a number of weather related incidents that have resulted in large landslide events entering this stream system. The habitat in this system was severely compromised by these events. In 1998, a contract was established between SUBASE Bangor and the Fisheries Division of the WDFW to accomplish the following tasks:

- Estimate the production potential of this system. How many adult pairs can the streams sustain in their present condition?
- Assess the existing "wild" salmonid production.
- Provide a list of suggested remedies to be taken that would allow this habitat to produce fish at its natural capacity level.

This project began in 1999 and has funding approved for the year 2000. It is anticipated that the project will take two additional years to complete at a cost of \$25,000.00 per year. The mechanism for obtaining these funds is in place with an established line item with the Environmental Compliance office of CINCPACFLT.

- **Scot's Broom Removal**

SUBASE Bangor will remove Scot's broom from areas that have become infested with this invasive weed species. These areas will then be planted with native trees and shrubs after the soil have been amended. Soils that have been grossly disturbed by machinery in Western Washington are usually left devoid of topsoil and are severely nitrogen deficient. Scots' broom, a nitrogen fixer, has the ability to take nitrogen from the air and transfer into the soil through nodules within its root system. Hence, disturbed areas are ideal for the heavy growth of this species. Scots' broom affords little habitat value other than erosion control. In the past, SUBASE has used project mitigation funds to complete this type of work. This work has shown that there are viable mechanical means to remove this weedy species. Results in the past have also shown that if the area is re-planted promptly, Scots broom can be kept out.

Methodology: Two to three acre parcels of Scots' broom covered ground will have this plant removed mechanically by the end of March each year for the life of this document. The soils will then be amended with chip mulch containing a natural fertilizer. Native trees and shrubs will then be planted in the area from which the plant is removed. Removal of Scots Broom and the re-planting of the treated area shall be completed within the same year.

6.11.1.5 Future Management Projects

- **Stand Conversion Projects:**

Introduce hardwoods into monoculture conifer stands. Hardwoods have generally been removed as a "weedy" species. This project will allow for present hardwoods to be left standing and use Forestry funds to re-introduce such species as big leaf maple, cascara, hawthorn, native crabapple, and native cherry. This effort will increase diversity within stands and of course, increase diversity throughout SUBASE Bangor. This project will be funded through the Forestry Program.

- **Initiate Forest Thinning.**

Thinning will become the primary method of removing timber from SUBASE Bangor. Spatial determinations will be determined on a site-specific basis. For example, a timber harvest is currently being planned in an area, which has little age diversity within the stand. The method of harvest will be to harvest no trees with a DBH, diameter breast height, less than 6 inches. We will also not harvest any trees in which the DBH exceeds 18 inches. This area will be planted soon after harvest and the result will be a stand with a minimum of three age classes of trees. This method will create a much-needed diversity within this stand. Another example is of a planned thinning in a stand of small diameter timber and containing no under story. This area will be thinned to a level of leaving the best tree every 25 feet. This treatment will open the canopy allowing the under story to develop while promoting diversity when this area is re-planted. As this is

a routine activity within the job description of the forester, no additional funds are anticipated for this project.

- **Diversify Wetland Species:**

SUBASE Bangor will increase the diversity within its wetlands by planting wetland plant species. Species composition and plant diversity in these wetlands is dependent upon where the wetland is located, how it was formed, and the length of time it has been established. Some of the wetlands were formed by natural processes a long time ago and contain a very diverse plant community. Others have been more recently formed by construction activity or were created to benefit the storm water system. It is these latter wetlands in which the species diversity is lacking. It is the objective of this project to transplant species from wetland containing well-established diverse communities into wetlands that contain only a single species. Present staff will accomplish this work with the occasional assistance of the personnel from the Self-Help Unit. The need for additional funding is not foreseen throughout the life of this document.

- **Convert Site A Leachate Management Tanks to a Recreational Fish Hatchery:**

Site A is an Installation Restoration Site. The soils in this area were found to contain TNT and RDX concentrations derived from past activities when this area was an EOD burn site. The soils have achieved cleanup levels and there are two 120,000-gallon open-air storage tanks that will be converted to a trout hatchery. Raising trout is more cost-effective than purchasing trout to provide quality of life to the military. It is anticipated that these tanks will be turned over to SUBASE Bangor in FY2001. The existing tanks, piping, and some of the pumps will be left in place and will serve to create a trout hatchery at this location. Fish from this facility will be raised to cacheable size, 7 or 8 inches, and then released into the lakes. This will allow SUBASE Bangor to release more fish into the system at considerable savings to the Fish and Wildlife program. It is anticipated that the cost of this transition will be about \$25,000.00. Funds for this project will be applied for via the Environment Program at CINCPACFLT.

- **Commercial Oyster Sale:**

SUBASE will participate in this program by offering to lease a portion of the shellfish beach for the purpose of commercially harvesting oysters. SUBASE currently has five distinct beach areas designated for harvest. Four of these beaches are recreational beaches to be used by authorized personnel. The remaining beach has been given over to the Point No Point Tribal Council to manage as a Tribal fishery. This action was taken in light of the Boldt decision, which stated that Tribal members in the State of Washington had the right to harvest 50% of the available shellfish. Commercial harvests will occur only on the SUBASE recreational beaches and will occur only after that particular beach has been harvested. It is common after a harvest by shell fishermen that a large number of oysters are left on the beach. These are left due to the inability of these folks to gather these oysters. These oysters are considered to be surplus. Funds realized from these sales will be placed into the Agricultural Outlease Program. SUBASE will submit Fish and Wildlife project for funding through the program administered by NAVFAC.

Methodology: A statistical estimate of the number of oysters present on the described beach will be made and offered to the highest bidder. A lease agreement will be written up and signed by the Navy's designee and the lessee. In this, the lessee will agree to harvest oysters within a one-year period and submit to all SUBASE Security regulations. They will also agree to re-plant the harvest area with a pre-determined amount of spat oyster shell.

6.11.2 Camp Wesley Harris

Camp Wesley Harris, which is under the management and operation of the SUBASE Bangor Commanding Officer, is located approximately 7 miles south and 1 mile west of SUBASE Bangor. This area comprises 388 acres. There have been periodic timber surveys and a wetland survey completed for this area. Personnel stationed at this facility have noted the presence of Black Tailed Deer and Black Bear. No formal surveys for any other species has been completed for this facility. Therefore, it will be necessary to survey for small mammals, birds, amphibians, reptiles, and fur bearers. Small Mammal surveys will be completed as a part of the timber harvest program.

6.11.2.1 Ecosystem Monitoring Projects

- **Small Mammals Surveys:**

Small mammals, such as deer mice, squirrels, and wood rats, mountain beaver, bats, and rabbits, are the species that provide the prey base for higher orders of birds and mammals such as, hawks, owls, coyotes, and bobcat. These species are usually robust in number, somewhat cyclic, and utilize small habitats. As an integral part of the SUBASE Bangor Forest Practices, all proposed timber harvest will be surveyed for the presence or absence of small mammal species. These sites will be surveyed prior to and shortly after the timber harvest is complete and data gathered will provide information that may be used in the planning process of future timber harvests. As this task is currently a routine assignment within the Wildlife Biologist's job description, the need for outside funding is not anticipated.

Methodology: Small mammal surveys will be conducted by laying a numbered grid over the map of a proposed timber harvest area. Transect starting points will be established through a random drawing of grid line numbers. The length of each transect will be 100 meters with no transects being closer than 50 meters. The number of transects will be sufficient to cover the proposed timber harvest area. Trap stations will be established every 20 meters along each transect and each station will accommodate 2 traps; 1 shadow box trap and 1 Museum Special snap-trap. These traps will be baited with peanut butter and oatmeal and checked for capture every day for a period of three days. The timber harvest area will be surveyed prior to harvest and within one year of the completion of the harvest. Accrued data may be used to design future harvest cuts.

6.11.2.2 Baseline Data Gap Projects

- **Black Tailed Deer Population Survey:**

A mark-recapture base line population study will be initiated at Camp Wesley Harris.

- **Black Bear Study:**

Black bear have been sighted on Camp Wesley Harris. In order to manage the population, a study is proposed to determine the following:

- Determine the residence time of each animal or whether they are transitory;
- Determine population parameters; such reproduction, mortality, habitat needs.
- Determine relatedness of individuals within this population.

Methodology: The study includes two distinct methods of determining population and gender of these animals. One method is to capture bear in a foot snare trap and fit it with a radio collar and the other is to extract DNA from hair and fecal samples. Four bear were captured and collared and their movements were recorded through Kitsap County. This project is anticipated to begin the spring of FY2001 and continue through FY2003. Labor will be in-house staffing. Funding for equipment and laboratory costs is estimated to be \$5000 and it will be requested through the EPR system.

- **Amphibian and Reptile Survey:**

It will be necessary to contract with an institution similar to the University of Washington in order to complete the Amphibian and reptile survey. This work will be completed in the year 2004. This project is estimated to cost approximately \$12,000.00 and funds will be applied for via the Agricultural Outlease Program.

- **Bird Survey:**

SUBASE Fish and Wildlife staff will survey for birds and furbearers with assistance from the Kitsap Audubon Society. This work will be completed in the year 2002.

- **Fur Bearers:**

SUBASE Bangor staff will perform a baseline survey for these species in the years 2000 and 2001. This group is somewhat further defined as skunks, beaver, otter, mink, and weasels. These are species expected to be present on Camp Wesley Harris. This study will define species present, habitat in which they are found, and area of concentration. In-house staff will complete the project and the estimated costs of materials needed are \$10,000.00. These funds will be applied for through the CINCPACFLT Environmental Compliance Office.

6.11.3 Toandos Peninsula

Toandos Buffer Zone is a 768-acre remote area in Jefferson County across Hood Canal from SUBASE. Forest inventories have been accomplished. Some stream survey work has been done.

6.11.3.1 Ecosystem Monitoring Projects

- **Small Mammals Surveys:**

Small mammals, such as deer mice, squirrels, and wood rats, mountain beaver, bats, and rabbits, are the species that provide the prey base for higher orders of birds and mammals such as, hawks, owls, coyotes, and bobcat. These species are usually robust in number, somewhat cyclic, and utilize small habitats. As an integral part of the Forest Practices, all proposed timber harvest will be surveyed for the presence or absence of small mammal

species. These sites will be surveyed prior to and shortly after the timber harvest is complete and data gathered will provide information that may be used in the planning process of future timber harvests. As this task is currently a routine assignment within the Wildlife Biologist's job description, the need for outside funding is not anticipated.

Methodology: Small mammal surveys will be conducted by laying a numbered grid over the map of a proposed timber harvest area. Transect starting points will be established through a random drawing of grid line numbers. The length of each transect will be 100 meters with no transects being closer than 50 meters. The number of transects will be sufficient to cover the proposed timber harvest area. Trap stations will be established every 20 meters along each transect and each station will accommodate 2 traps; 1 shadow box trap and 1 Museum Special snap-trap. These traps will be baited with peanut butter and oatmeal and checked for capture every day for a period of three days. The timber harvest area will be surveyed prior to harvest and within one year of the completion of the harvest. Accrued data may be used to design future harvest cuts.

6.11.3.2 Baseline Data Gap Projects

The Legacy Resource Management Program provided funding in 1994 in which all of the wetlands on the Toandos Peninsula were delineated. These funds were also used to restore and enhance the Brown Point salmon stream during this same year. Code 043, Environmental Division, Keyport completed a plant survey detailing the species with the plant community in 1993 as discussed in previous sections. Bald Eagle surveys and nest territory designations have been completed with the assistance of the USFWS and WDFW. Dean Smith, EFA, completed a salmonid occupancy and habitat inventory in 1997. In order to complete the Natural Resources Baseline Survey list, it will be necessary to survey for both large and small mammals, birds, and fur-bearers. The University of Washington surveyed for amphibians and reptiles in 1997. All of the previously mentioned protocols will be used in these studies.

- **Large Mammal Survey**
Small and large mammals will be surveyed for as a part of the timber harvest program.
- **Fur Bearers:**
A baseline survey for these fur-bearers will be conducted in the years 2000 and 2001. This group is somewhat further defined as skunks, beaver, otter, mink, and weasels. These are species expected to be present on Toandos Peninsula. This study will define species present, habitat in which they are found, and area of concentration. In-house staff will complete the project and the estimated costs of materials needed are \$10,000.00. These funds will be applied for through the CINCPACFLT Environmental Compliance Office.
- **Bird Survey:**
Bird surveys will be completed in 2002, with the work for this project contracted out to the appropriate Audubon Society or a research institution such as the University of Washington.

7.0 Fisheries Management

SUBASE Bangor provides numerous recreational fishing opportunities. Freshwater fishing is authorized in four lakes. Saltwater fishing and shellfishing opportunities include the Hood Canal waterfront and crabbing is allowed on some piers.

Fisheries management centers on the balance of responding to the military mission of the Base while maintaining, protecting and conserving the fishery resource in terms of quality, quantity, and diversity. As part of its stewardship of the waters entrusted in its care, SUBASE Bangor has the additional responsibility of ensuring optimum utilization of those waters while maintaining ecological integrity. This portion of the INRMP focuses on the principles of multiple use and sustained yield.

7.1 Applicable Federal Laws, Regulations, and Policies

There are numerous Federal laws that impact fisheries management. Broad based laws such as NEPA and CZMA have been addressed in the introductory chapter of this INRMP. Discussion herein is restricted to the laws mostly directly associated with fisheries/fishing.

Fishing at SUBASE Bangor is regulated through a recreational fee permit system that is administered by MWR. Permits may be purchased at Pacific Edge Outfitters. Permits are required for all personnel over the age of 14. A current fee schedule is posted at Pacific Edge Outfitters.

Table 10. LAWS AND REGULATIONS FOR FISHERIES MANAGEMENT

<i>Fish and Wildlife Coordination Act, as amended, Public Law 85-624, 16 USC 661 et seq.</i>	This law was enacted to ensure that fish and wildlife conservation receives consideration equal to, and coordinated with, other features of water resources programs. Actions that would modify stream or water body require consultation with USFWS and Washington State Fish and Wildlife, as the Navy must give full consideration to the wildlife aspects of that action.
<i>Sikes Act, as amended, Public Law 86-797, 16 USC 670(a) through (o)</i>	This act requires each military department to (1) ensure that services are provided for management of fish and wildlife resources on each installation; (2) provide their personnel with professional training in fish and wildlife management; (3) give priority to contracting work with Federal and state agencies responsible for conservation or management of fish and wildlife. The Act also requires preparation of a fish and wildlife management plan to be carried out in accordance with a cooperative agreement mutually decided upon by the Secretary of Defense, Secretary of Interior, and the state agency designated by each state. Without the cooperative agreement, neither fishing nor the collection of fees is legal.
<i>Fish and Wildlife Conservation Act, Public Law 96-366, 16 USC 2901 et seq.</i>	This act provides for conservation, protection, restoration and propagation of non-game fish and wildlife species and their habitats.
	This directive establishes an integrated program for multiple-use management of natural resources on property under DOD

<i>DODDIR 4700.4, Natural Resources Management Program</i>	control. In terms of fish and wildlife management, it calls on installations to conserve resources for the benefits of the public, after proper safety and security measures have been taken; protect threatened and endangered species and their habitats; and establish permit structure in addition to that required by the State.
<i>OPNAVINST 5090.1B, Environmental and Natural Resources Protection Manual</i>	Covers natural resources management and NEPA procedures.
<i>SUBASEBANGORINST 1710.12</i>	This instruction identifies (1) authorized fishing personnel and areas (2) license and permit requirements; (3) regulations concerning limits, seasons and harvest tools; and (4) violation actions governing fishing, shellfishing, and crabbing. This instruction is subject to yearly updates and should be consulted prior to participation in the fishing program.

7.2 Program Goals and Objectives

The historic role of fisheries management has been to limit the impact of consumptive use on an aquatic environment so that it is able to sustain life and maintain a natural population capacity on an ongoing basis. SUBASE Bangor has expanded that function to include the following long-term goals:

- Ensure aquatic ecosystems are healthy.
- Support an optimal mix of multiple use on aquatic resources.
- Maintain partnerships with agencies and groups involved in fisheries management.

In order to meet these goals, the following objectives are established:

- Apply standards of environmental quality and habitat protection in a manner consistent with the principles of ecosystem management.
- Provide quality recreational fishing opportunities that are optimized and compatible with other programs.
- Protect all threatened and endangered aquatic species and habitat that are on or near the installations.
- Restore altered or degraded aquatic ecosystems.
- Assist state and federal agencies and non-governmental organizations through data collection and sharing of data and participation in an interagency cooperative agreement.
- Improve knowledge of non-game aquatic species, such as non-sport fish and invertebrates.

It is SUBASE Bangor's intention to implement these objectives in harmony with the State in a manner that promotes benefit to the resource now and in the future.

7.3 Habitat Descriptions

7.3.1 Freshwater Lakes and Ponds

Several lakes are stocked for recreational freshwater fishing and require a State license and SUBASE Bangor permit through out the year. Fish are maintained in Devils Hole, Cattail Lake, Trident Lakes, Lake Ruth and Kid's Pond. Saltwater fishing and shellfish harvest are available in Hood Canal with State licenses during seasonal openings. All fishing in SUBASE managed waters requires both State licenses and SUBASE Bangor permit.

At this time, there is no plan to reintroduce extirpated species. Fish stocking of fresh water lakes will continue in order to support the recreational fishing activity. Approximately 4000 rainbow trout are annually released into four freshwater lakes in the Bangor North, West, and South management areas.

7.3.2 Streams

A survey of all salmon streams in the Devils Hole watershed is currently underway by WDFW. This survey will assess the overall fitness of the stream system including salmon use and sources of sedimentation.

A survey is planned to determine population levels of fur bearing mammals, needs for their management, and their impact upon listed salmonids.

7.3.3 ESTUARIES

SUBASE, Bangor, has no estuaries within its boundaries. This habitat type does not exist at SUBASE.

7.3.4 HOOD CANAL

Hood Canal is a fjord like water body that is classified as pristine by the State of Washington. Hood Canal contains numerous species of fish, (see species list); most importantly Chum salmon, Coho salmon, and hatchery Chinook salmon. Mussels, clams, and oysters are also commercially important species. All fisheries management in the Hood Canal is under the joint jurisdiction of the Point No Point Tribal and the Washington Department of Fish and Wildlife. These agencies are tasked with setting harvest quotas, species management, and habitat monitoring within this area. SUBASE manages its salt-water fisheries program as well as its shellfish recreational harvest program within the rules and regulations established by this body.

7.3.4.1 Fish and Shellfish

Shellfish surveys were completed in 1997. This work was done with the assistance of the Point No Point Treaty shellfish biologists in order to determine the population of clams and oysters so that SUBASE could allow for Tribal harvest. It was determined that SUBASE beaches contained over 1.5 million clams and approximately 800,000 oysters. Based on this survey, the beach between Delta Pier and the Keyport Bangor Dock were given to the Tribes to harvest and manage. The SUBASE Commanding Officer and the Point No Point Treaty tribes signed a shellfish agreement in 1998.

Agricultural leases will be used for the management and commercial harvest of shellfish.

7.3.4.2 SPORT AND COMMERCIAL HARVESTS

1. **FRESH WATER FISHING:** Fresh water fishing is allowed at Devils Hole Lake, Cattail Lake, Trident Lakes, Lake Ruth, and the Kids Pond. All lakes with the exception of Lake Ruth are stocked with 10" to 12" Rainbow trout. Fishermen are required to have a Washington State Fishing License as well as a SUBASE Outdoor Recreation Permit. Each lake has a limit of fish to be caught per day per fisherman. These limits are enforced by the SUBASE Game Warden. Fishermen have taken an average of 3,500 fish per year from these lakes over the last ten years. Lake Ruth was stocked with large-mouth bass in 1991 and in 1995, bluegill were added as a foraging species. Fisherman is allowed to keep 5 bluegill per person but must release all bass unharmed.

Fishing results for 1998 and 1999

		Rainbow Cutthroat Blue gill Bass			
Lake Ruth	1998	---	---	842	695
	1999	---	---	532	416
All other lakes					
	1998	4,476	*964	---	---
	1999	4,862	*719	---	---

- Cutthroat are listed as sensitive by WDFW and have been proposed to be added to the Endangered Species List. Anglers may retain only fish with a clipped adipose fin. All others must be returned to the lakes unharmed.
2. **SALT-WATER FISHING:** Fishing is allowed from the beaches at Floral Point and Carlson Spit. In addition, fishermen are allowed to fish from the Keyport/Bangor Dock and the Marginal Wharf when operations allow. All fishermen must have a WDFW salt-water fishing license as well as a SUBASE outdoor recreation permit in order to fish. All State and Federal rules and regulations apply and are enforced by the SUBASE Game Warden.
 3. **SHELLFISH HARVEST:** SUBASE has divided the tidelands into five separate recreational beaches. These areas are rotated for use depending upon the level of harvest. The Point-No-Point Treaty Council manages Beach #3, an area between the Keyport/Bangor Dock and the Delta Pier. This coalition of Native American Tribes manages this area for their own subsistence, and commercial uses. This action was done to comply with the Boldt Decision of 1974, which stated the Native Americans had the right to harvest 50% of harvestable fish stocks. All shell fishermen must have a WDFW Shellfish license as well as a SUBASE Outdoor Recreation permit in order to harvest shellfish. Shellfishers at SUBASE have averaged an annual harvest of 25,000 oysters and 51,000 clams over the last ten years.

HARVEST DATA

	OYSTERS	CLAMS
1997	29,067	91,901
1998	16,460	38,982
1999	17,830	41,584

Fishing and shellfishing have provided an average 6,200 man/days of quality outdoor recreation over the last ten years.

4. **COMMERCIAL HARVEST:** In the past, SUBASE allowed the commercial harvest of surplus oysters. The oyster bed was defined as to its dimensions and estimated oyster population. It was then offered for sale at a public auction and sold to the highest bidder. The proceeds from these sales went into an account that was established for SUBASE and the monies were only allowed to be spent on Fish and Wildlife projects that occurred at SUBASE. It has been recently determined that future sales will be accomplished through the Agricultural Outlease Program. Proceeds will be placed into this fund and SUBASE will apply for project funding from these monies.

7.3.4.3 AQUATIC VEGETATION

SUBASE has extensive eel grass beds along its shoreline. Epibenthic invertebrates thrive in this community. Pauley, G.B. University of Washington Fisheries Research Institute, identified 21 invertebrate taxa during an eel grass study completed in 1990. Of these, harpacticoid copepods and Gammarid amphipods were identified as the primary food source for juvenile chum salmon outmigrants, Bax, et. al., 1977. These organisms were found in juvenile salmon captured at SUBASE during a study completed to establish the Environmental Impacts of building the base. These beds have been mapped and afforded protection by the Navy as a matter of policy and in compliance with State law. Due to the recent addition of summer run chum salmon to the Endangered Species List, these beds are now protected as vital habitat for these species.

All of the piers that were built to accomplish and support the Trident mission were built away from the shoreline. This was done to avoid the high cost of dredging and as a result these valuable eel grass beds were preserved.

The Clean Water Act prohibits the introduction of any foreign substances into the Canal. Hence, all of the ships overboard drains are collected and pumped to an appropriate treatment facility. All storm water associated with these piers is also pumped off to a holding pond where it is then released through an oil water separator. Oil booms designed to contain any accidental spills surround all boats and ships at pier side. SUBASE also has an Emergency Spill Response Team that is trained and equipped to clean up any accidental spills.

7.4 MANAGEMENT OBJECTIVES/HABITAT TYPE

7.4.1 FRESHWATER LAKES AND PONDS

1. CATTAIL LAKE, TRIDENT LAKES, KIDS POND: These waters will continue to be used for “put and Take” fisheries. SUBASE purchases approximately 4,000 10” to 12” rainbow trout/year. These fish are distributed among these facilities and eligible participants are encouraged to catch and keep these fish.
2. LAKE RUTH: This lake was studied recently in order to establish population totals for both bluegill and bass. These estimates indicate that there is a bluegill population in excess of 1900 fish and the bass population is estimated at approximately 650 fish. Currently, fishermen are allowed to keep five bluegill but must return all bass unharmed. Based upon current information, SUBASE will allow all anglers to keep eight bluegill of any size and allow fishermen to keep three bass between 14” and 18”.
3. DEVIL’S HOLE LAKE: this lake is equipped with a fish ladder allowing fish access to Hood Canal. As previously noted, a study of these waters is currently underway by WDFW. Upon the completion of this study, the determination of how best to manage this lake will be made.

7.4.2 SALT WATER FISHING:

The current policy of allowing fishing at designated piers and beaches along the Canal will be continued. All State and Federal rules and regulations will be enforced by the SUBASE Game Warden.

7.4.3 TIDELANDS:

Shellfish beaches will continue to be rotated dependent upon the extent of recreational use. Commercial sale of oysters through the Agricultural Outlease Program may be pursued as quantities of surplus oyster’s dictate. Tidal eelgrass beds will be afforded continued protection. All construction projects planned for the marine environment will be subjected to the requirements of a Hydraulic Project Permit issued by WDFW. All construction projects will also have a Biological Assessment completed to determine their effects upon the listed salmonids.

7.4 Data Storage, Retrieval, and Analysis

Information is maintained in hard copy by each specialist, and also on AutoCAD for mapping purposes. Information can be obtained through the specialists, and through the SUBASE planning department for mapping needs.

8.0 Outdoor Recreational and Environmental Education Management

The Navy, as a holder of Federal lands, has various programs for outdoor recreation. These programs are designed to be compatible with national defense and security requirements while

ensuring integrated multiple uses of existing recreational resources. Outdoor recreation consists of both consumptive (hunting, fishing) and nonconsumptive (picnicking, hiking) uses.

Outdoor Recreational Management has at its core, a discussion of management, conservation, and development of outdoor recreational uses. On SUBASE Bangor the outdoor recreational program has the two-fold benefit of taking pressure away from nearby areas and generating a positive impact on staff productivity and retention.

In addition to the numerous recreational facilities available to the general public in the Puget Sound region, SUBASE Bangor provides a wide range of outdoor activities to military personnel, their families, and Federal employees associated with the base. These include hunting, fishing, hiking, boating, picnicking, and bicycle opportunities. Morale, Welfare and Recreation (MWR) manages and provides the recreation program in support of the Navy mission. The emphasis area for development of recreational projects is the Bangor South Management Area. This area has been designated in the SUBASE Bangor Master Plan as the area for Community Support.

8.1 Applicable Federal Laws, Regulations and Policies

There are a number of Federal laws that govern the management of outdoor recreation. Broad-based laws such as NEPA and CZMA have been addressed in the introductory chapter of this INRMP. Discussion herein is restricted to the laws most directly associated with outdoor recreation on a military facility.

Table 11. LAWS AND REGULATIONS ON RECREATION

<i>Military Reservations and Facilities: Hunting, Fishing and Trapping; Public Law 85-337, 10 USC 2671 et seq.:</i>	This statute, an update of the Military Construction Authorization Act, provides that hunting, fishing and trapping on military lands must follow state law.
<i>National Trails Systems Act; Public Law 90-543, 16 USC 1241-1249</i>	This statute promotes the development of recreational, scenic, and historic trails for people with diverse interests and abilities.
<i>Outdoor Recreation on Federal Lands, 16 USC 460(1) et seq.:</i>	Defines a program for managing of federal lands for outdoor recreation.
<i>Memoranda of Understanding between DOI and DOD for the Development of Public Outdoor Recreation Resources on Military Installations (7 Apr 1978) and between US Park Service and NAVFAC (27 Apr 1986):</i>	These memoranda establish and provide guidance on the Navy's responsibility in terms of managing natural resources for outdoor recreation.

8.2 Program Goals and Objectives

The goal of the Outdoor Recreation Program on SUBASE Bangor is that quality outdoor recreational opportunities are optimized in a manner that neither interferes with the primary mission nor disturbs the ecosystems. To achieve this goal, SUBASE Bangor has set forth the following objectives:

- Recreational uses are compatible with some ecosystems.
- Levels of consumptive use are maintained on a sustainable basis.
- Partnerships are established with SUBASE Bangor and other groups/agencies.
- Safety and quality are emphasized in all recreational programs.

SUBASE Bangor has 7,202 acres, of which 4000 are open for hunting. In addition, there are 29 acres of lakes and 5 miles of waterfront shoreline open to fishing.

8.3 Dispersed Outdoor Recreation

Dispersed outdoor recreation that occur on SUBASE Bangor include hunting, fishing (including shellfishing and crabbing), hiking, nature study, non-motorized boating (canoeing and rowing) and firewood cutting.

8.4 Deer Hunting

The SUBASE Bangor Hunting program is managed through consultation with the Washington State Fish and Wildlife Department. Hunters must comply with SUBASEINST 1710.7 as well as appropriate State and Federal regulations. These instructions and notices are subject to yearly updates and should be consulted before participating in hunting. Hunting is open to active duty military personnel, their dependents, retired military personnel, Federal employees of the SUBASE Bangor, and reservists. Recreation harvest permits and Washington State hunting licenses are required of all persons who hunt on SUBASE Bangor

Enforcement of hunting and fishing laws and regulations is carried out primarily by a professionally trained game warden assigned to SBUASE Bangor Environmental Resources Division. Assistance is given by the SUBASE Bangor police force, the Auxiliary Security Force, the Chief Master at Arms.

Safety concerns are the utmost importance in the SUBASE Bangor hunting program. SUBASE Bangor has established the following objectives for natural resource related recreation:

- Provide opportunities for high-quality non-intrusive natural resource related recreation to the military community and their families.
- Manage natural resource related recreation consistent with the needs of the SUBASE Bangor military mission and ecosystem integrity.

8.5 Hiking

Opportunities for hiking are available near Trident Lakes, Cattail Lake, and Devils Hole Lake through the forested area.

8.6 Bicycling

Bicycling is permitted along SUBASE Bangor roads and bike trails. Bicycles must be registered and have lights, and helmets and vests must be worn.

8.7 Nonmotorized Boating

Nonmotorized boating opportunities are available at Cattail Lake, Devils Hole, and Lake Ruth. Access ramps are available and rental boats are available through Pacific Edge Outfitters.

8.8 Firewood Cutting

Firewood cutting is permitted in designated areas of SUBASE Bangor following logging operations. Active duty and retired military are authorized to cut firewood by the way of firewood cutting permit, which may be purchased at Pacific Edge Outfitters.

8.9 Concentrated Outdoor Recreation Activities

Picnicking primarily occurs at Trident Lakes and Cattail Lakes. The picnic area at Trident lakes has shelters, tables, grills, ball fields, restrooms, and a short trail. Cattail Lake has a picnic table and access floats for fishermen.

8.10 Motorized Boating

Gasoline powered motor boats are not allowed on SUBASE lakes. Electric motors are allowed on Devils Hole and Cattail Lakes. Motor boats are allowed on Hood Canal, but recreational boating within the security zone is by Coast Guard permit only,

8.11 Military Mission Considerations

The military mission has priority over recreation involving access to natural resource areas. Hunting, fishing, shellfishing, ball fields, fitness courses, hiking and bicycle trails and picnic areas are provided on the installation in the way of outdoor recreation. Conflicts between outdoor recreation activities and the military mission can occur. When this occurs, recreational activities will give way to the military mission needs.

Recreational activities are part of the support for the military mission. Outdoor activities and projects must be integrated into this plan and be as sensitive as possible to needs of natural resources.

Certain activities and access are restricted in the interest of national defense as safety, and security dictate. The exercise of care, judgment, and cooperation with authorities is expected of all persons who enter the installation for the purpose of hunting and fishing.

Recreational activities are prohibited at Camp Wesley Harris, a firing range, for safety purposes. At certain times, recreation activities on SUBASE Bangor may be curtailed within various ESQD arcs during explosive handling activities. All areas within the INRMP can be closed at the discretion of the SUBASE Bangor Commanding Officer.

8.12 Public Access

The Sikes Act, DOD Directive 4700.4 (*Natural Resources Management Program*, 24 January 1989) and DODINST 4715.3 encourage public access onto DOD lands for the enjoyment and use of natural resources, if it is compatible with the military mission and if the ecosystem can support such use.

Individuals are currently allowed access to installation properties in official business capacity as contractors, suppliers, or consultants, and as guests of Navy personnel and families. Military and civilian personnel, retired military, their families, and guests are allowed use of recreational facilities provided on the installation. Recreational harvest permits are issued to SUBASE Bangor personnel and their families. Other public use is not allowed.

Special access is allowed to Point-No-Point Treaty Tribal members to harvest from their managed shellfish beach in accordance with an agreement between SUBASE Bangor and the Tribal representatives.

Suquamish Tribal members have been granted access to gather traditional cedar bark supplies.

8.13 *Hunting and Fishing Programs*

Deer hunting is allowed by active and retired military personnel and civilian employees during established seasons. The harvest of deer is based on a harvestable surplus and sustained yield system. WDFW regulations are designed to allow harvest of surplus animals without impacting long-term populations. Harvest goals are to maintain stable deer populations at or near carrying capacity. All State hunting laws and licensing are followed. SUBASE Bangor recreational harvest permits are also required with fees providing partial support to the Fish and Wildlife program.

Several lakes are stocked for recreational freshwater fishing. Shell fishing is also allowed on designated installation saltwater beaches. Fishing and shell fishing require a State license and Bangor recreational harvest permit. Permit Fees collected help support the installation Fish and Wildlife program. Fish are stocked in Devils Hole, Cattail Lake, Trident Lakes, and Lake Ruth. Saltwater fishing is available in Hood Canal with State licenses during seasonal openings.

There is no recreational trapping program on the SUBASE Bangor managed lands.

8.14 Other Natural Resources Oriented Outdoor Recreation

A Master Trail Plan has been developed for SUBASE Bangor and gives guidelines to trail development and location. The best locations for trail development would be found in the Devils Hole area, and the West Family Housing area. The trail plan is being implemented by the Public Works Department through recycling funds. Trails are being constructed in annual increments towards development of the plan. Future potential may exist to connect existing trails. Existing trails must also be maintained or improved to minimize environmental impacts. The Toandos management area also is an area to be examined as a potential site for trails and possible interpretive activities.

As directed in the Master Trail Plan, bicycle trails have been constructed along major arterial roads on SUBASE Bangor. These are to help separate bicycles and motor vehicles to improve safety. They are also to encourage use of bicycles for commuting and recreation. MWR is interested in locating existing arterial roads and old logging roads that would be appropriate for mountain bike use. Their greatest interest for the future, following the Master Trail Plan implementation, is in marking routes and creating maps rather than developing new trails.

8.15 Recreation and Ecosystem Management

People and social uses/needs are an integral part of ecosystem management. The outdoor recreation program is based on providing quality experiences while sustaining ecosystem integrity. Activities that have a direct effect on species populations such as game harvest, or soil erosion from hiking trails, will be monitored to determine effects, and adaptive management (i.e. water bars on trails) incorporated to mitigate negative impacts. Special consideration will be given to protecting critical areas (e.g., cultural resources sites) from negative impacts due to outdoor recreation or ecosystem management activities.

8.16 Safety and Security

Outdoor recreation, while generally not excessively hazardous, does require awareness and care to avoid dangerous situations. It is always possible to get lost or to have children wander away. When leaving a road and walking into the forest, individuals should always have a map and compass, and be aware of their surroundings. Children should carry a whistle and be aware of the “Hug a Tree” concept to stay in one place if they become lost.

Because of the habitat on SUBASE Bangor, there are animals that can be and periodically are encountered. These should be treated as wild animals no matter what the situation. People should never attempt to handle or feed them. If there are young animals present, there is a special need to watch out. Among resident wildlife are black bears and cougars. These animals are generally elusive, but at times may be encountered. To reduce encounters, keep pets inside at night and don't leave pet food outside. Wash barbecue grills after use and keep any fish parts and meat waste in your freezer until they can be disposed of properly. Store garbage in cans with tight-fitting lids so odors do not attract small mammals. Closely supervise small children and be sure they are indoors by dusk. Deer while seeming to be innocuous can be dangerous if frightened and remember that they also attract predators. Drivers must pay special attention especially at dusk and night to avoid hitting them.

If there are encounters with bear or cougar, it is important to be careful not to provoke a reaction. Individuals must stop, stand tall, and not run. Stay calm and avoid direct eye contact. Running may stimulate an animal's instinct to chase. Do not approach the animal. Face it, talk firmly, and try to scare it away by aggressively clapping your hands or yelling. If it aggressively approaches, be more assertive, including shouting, waving your arms and throwing rocks. If the animal attacks, fight back aggressively. With a cougar, try and stay on your feet. If with a black bear, as a last resort, roll up into a ball or lie flat on the ground, play dead, and do not move until you are certain the bear is gone.

If an emergency does happen, SUBASE assistance can be found at:

Security Dispatch: (360) 396-4444
Fire Emergency: (360) 396-4333
Ambulance Service: (360) 396-4222
Medical Clinic: (360) 315-4391

Telephone Operator: 0
County Dispatch: 9-911

All people living or working at SUBASE Bangor need to be aware of the natural resources and how their actions affect ecosystem components, and how ecosystem management can sustain the military mission. The objectives of the awareness program are to:

- Create a conservation ethic in those who use SUBASE Bangor's lands.
- Provide an understanding of the natural resources program to the installation and surrounding communities.
- Provide opportunities for the study and appreciation of watchable wildlife, as well as the interpretation of other elements of natural history.
- Provide decision makers with the information needed to make judgments affecting the natural resources program.
- Provide general conservation education to the community.
- Enhance the professional skills of the SUBASE Bangor natural resources staff.

This goal will be reached by increasing public awareness of environmental programs, educating the workforce about the installation's environmental program, and training customers on installation environmental requirements.

SUBASE Bangor is dedicated to providing personnel with the knowledge to value natural resources and make a positive contribution to local conservation in a safe manner. Its extensive program, frequently involving a significant portion of the staff's personal time, has achieved media attention and the thanks of citizens.

The principal role of the Environmental Education Program is to inform individuals about the natural resources at SUBASE Bangor and the Annex and the surrounding community. Personnel training is to be centered on improving compliance with environmental laws and regulations through increased awareness and sensitivity, focusing on safety as well as preservation and restoration.

An Environmental Education Program gives the public a greater understanding of the forces that shape the environment; an awareness of the individual as an integral part of the environment; and human dependency upon, and responsibility for, the quality of the environment. To this end, SUBASE Bangor has established these goals for environmental education:

- Employees and families are knowledgeable of SUBASE Bangor's environmental concerns so as to support the military mission.
- The community is aware of SUBASE Bangor's environmental and stewardship efforts.

In order to meet these goals, the following objectives are established:

- SUBASE Bangor's compliance with environmental laws and regulations will increase through heightened awareness and sensitivity.
- Quality of life, and therefore productivity, of the employees is enhanced through environmental education.

- SUBASE Bangor maintains formal partnerships with Federal, State and local agencies.

Recreation Management plans include:

- Provide signage identifying locations of and direction to cultural and natural resources features that provide recreational opportunities.
- Establish disabled-accessible “Watchable Wildlife” programs that highlight the abundant natural resources.
- Improve and advertise the wildlife rehabilitation program.
- Attend and support public functions and community events.
- Prepare and present papers or lectures at conferences and symposia.
- Respond to routine inquiries and requests for natural or cultural resources information.

Non-consumptive uses of natural resources include passive recreation (hiking, biking, and observation), wildlife education, and general aesthetic appreciation. It is essential to recognize that passive recreation can have an environmental impact – simple presence of humans within natural habitats can be disruptive to certain wildlife. Public education is an important tool in wildlife protection and wise stewardship.

Stability of outdoor recreation education should be a top priority. The resources of SUBASE Bangor are too valuable not to promote their understanding to visitors.

8.17 Education

8.17.1 Professional Education

Continuing education, training courses, and workshops allow managers to stay up-to-date with the latest research findings and application techniques. Personal membership in professional societies is encouraged, including The Society of American Foresters, The Wildlife Society, National Military Fish and Wildlife Association, Kitsap Audubon Society, and National Military Game Warden Association. These societies produce some scientific publications in natural resources. Meetings of these societies also provide excellent ways to communicate with fellow professionals, as well as maintain professional standards.

The Environmental Division and SUBASE Bangor personnel are encouraged to join professional societies and become active members. Personnel will be sent to as many meetings as feasible to meet with other professionals to exchange ideas and attend technical meetings. It will be an objective to send at least one natural resources manager to the annual meeting/ training workshops of the National Military fish and Wildlife Association and the Wildlife Society. Maintenance and enhancement of professional skills will be emphasized.

Plans for enhancing the educational outreach program include:

- Prepare periodic news releases about SUBASE Bangor natural resources management activities for on and off-base newspapers.

- Coordinate with teachers to support recurring school programs such as Arbor Day and earth day field trips.
- Talks to service clubs and other neighborhood groups on SUBASE natural resources.

8.17.2 Training

Special training for LEA personnel on natural and cultural resource laws is necessary to meet legal requirements and liability protection. It ensures the installation game warden has the same level of expertise as State law enforcement officers aiding in cooperative activities.

8.17.3 Public Awareness

SUBASE Bangor personnel are encouraged to participate in Earth Day activities. This has been celebrated on the installation since 1984. These activities are a means to provide education to the military and civilian communities.

SUBASE Bangor military and civilian personnel are kept informed about environmental awareness activities through new employee indoctrination briefs and also news articles placed in the installation newspaper, the *Trident Tides*.

Environmental/Natural Resources employees continue to volunteer at:

- Local water festivals.
- Clean up projects around Puget Sound and along highways.
- Creating educational displays.
- Judging science fairs.
- Promoting tree planting.
- Arranging and guiding tours of SUBASE Bangor.
- Creating craft kits for Earth day distribution to elementary school children.
- Volunteering in classroom education concerning recycling, composting, and story telling.

These are all activities that can increase the public and workforce awareness of natural resources.

Volunteers have been important in the management of natural resources at SUBASE Bangor and utilizing them also provides a means to educate the participants. The Audubon Society has assisted in a number of bird censuses. Civilian groups such as the Boy Scouts, Camp Fire, and vocational technology students assist in tree planting projects. In addition, SUBASE personnel have volunteered to assist in all aspects of the Fish and Wildlife program. The Self-Help personnel have been instrumental in providing both the material and the building skills needed to sustain a variety of programs.

9.0 Cultural Resources Management

The purpose of managing cultural resources is to be able to preserve those items and areas deemed culturally significant in order to utilize them for understanding other ways of life. The better we understand the experiences of those who have gone before us, the better we can predict what will happen in our own time.

9.1 Applicable Laws, Regulations and Policy

There are many overlapping laws, regulations, Defense and Naval Instructions that stipulate management concerns for cultural resources. The more extensive acts are detailed in the following table.

Table 12. LAWS AND REGULATIONS ON CULTURAL RESOURCES

<i>Antiquities Act of 1906, Public Law 59-209, 16 USC 431 through 433</i>	Provides for the protection of historic properties on Federal lands from unqualified excavation or destruction, and allows for the establishment of national monuments.
<i>National Historic Preservation Act of 1966 (NHPA), as amended; Public Law 89-665, 16 USC 470 et seq.:</i>	This is the most comprehensive legislation to deal with this topic. It requires projects funded with public money to address cultural resources. It calls for an inventory of all cultural resources, assessment of their significance, and recommendations for proper management of the resources. It further requires consultation with the state Historic Preservation Officer (SHPO) for undertakings that may impact resources eligible for listing on the National Register of Historic Places.
<i>Archaeological Resources Protection Act of 1979 (ARPA); Public Law 96-95, 16 USC 470(AA) through (mm):</i>	Protects archaeological resources on public lands by requiring permits for excavation and removal of cultural material.
<i>Native American Grave Protection and Repatriation Act (NAGPRA); Public Law 1010-601, 25 USC 3001 through 3013</i>	Provides for the protection of Native American Graves and the return to all human remains and funerary items to federally recognized Native American Tribes.

9.2 Goals and Objectives

The purpose of the SUBASE Bangor Cultural Resources Program is to preserve and protect the cultural resources on SUBASE Bangor. The protection of cultural resources on SUBASE Bangor requires minimal management effort. The remains of past land occupants are stationary, sometimes discreet, and not necessarily affected by the mere presence of humans. They do, however, deteriorate, erode, or otherwise lose integrity over time. Buried resources can be re-exposed during periods of natural erosion, through excavation, by humans and animals. The best protection that SUBAES Bangor can provide is to keep current human activities off of known sites, or, when that is not possible, minimize impacts. Furthermore, managers need to maintain the integrity of information collected from excavated sites.

9.2.1 Management of Known Archaeological Sites

Implementation of this INRMP is consistent with protecting cultural resources at Bangor SUBASE and its satellite management areas. The measures contained within this INRMP are to be compatible with the goals of the Historic and Archeological Resources Protection (HARP) Plan for SUBASE Bangor (March 1996).

The goal of the HARP Plan is to manage National Register resources in a manner that is compatible with the military mission of the SUBASE and its tenant commands. Navy actions will be planned to avoid potential National Register resources.

9.2.3 Cultural and Historic Resources

Cultural resource sites are divided into three Treatment Categories.

- Category I: Resources meet the National Register criteria and are classified as being of outstanding historical, architectural, archeological, engineering or cultural significance. Further, they have been evaluated as having retained their “integrity”.
- Category II: Resources meet the National Register criteria, but are classified as being of lesser historical, architectural, archeological, engineering or cultural significance than resources included in Category I. They may not be able to match Category I properties in terms of integrity.
- Category III: Resources that do not meet National Register eligibility criteria, as well as all World War II temporary buildings, and buildings in historic districts that are non-contributing elements of the district.

Undeveloped areas have been characterized by archeological survey as to high, medium, and low probability for the occurrence of hunter-gatherer resources. These probabilities will be considered as part of the planning process for future building and development. The highest probability of resource presence is along the salt-water beaches.

There are known historic use sites on SUBASE Bangor and the Toandos peninsula. The sites will be treated as though they are eligible for the National Register until it is determined that they are not. These are category I sites. Disturbance of Category I resources will not be allowed except for archeological research conducted under an ARPA or Antiquities Permit.

There are no Category II sites on SUBASE Bangor that have been located.

Category III consists of resources that do not, in the opinion of qualified professionals, meet the criteria for nomination to the National Register of Historic Places. Federal stewardship dictates proper maintenance of all Navy properties, but no special preservation measures are required for these resources. The identified category III resources include:

- Administration area district, buildings 1,3, and 4
- Industrial area district
- Original Commanding Officer’s and Senior Assistant’s quarters
- Marginal Wharf
- Camp Wesley Harris district
- Standing and collapsed historic structures

- Historic land use complexes
- Orchard complexes
- Edgar Austin grave

To prevent activities from affecting significant cultural resources, natural resources projects that involve ground disturbing activities must be processed through the HARP program manager. Natural resources projects in areas where eligibility of sites for the National Register of Historic Places (NR) has not been determined, require coordination and consultation that is proscribed in Section 106 of the National Historic Preservation Act (NHPA). For management purposes, sites deemed eligible for the NR are treated in exactly the same manner as sites that are actually listed in the NR. Concessions may need to be made to protect these sites. Professional archeologists will be called to evaluate possible archeological deposits if discovered in the future.

Discovery of archeological evidence of previous human occupation will cause work to stop, and the discovery to be protected from damage, on any undertaking at SUBASE Bangor until the following procedures can be accomplished:

1. Notify the Department of Interior, Office of Departmental Consulting Archeologists (DCA), at (202) 343-4101.
2. Notify the Washington State Historic Preservation Officer (SHPO) at (360) 407-0826.
3. Coordinate site visits by DCA arranged archeologist.
4. If DCA's representative makes a determination of no significant value, the SHPO must be notified in writing and given 30 days to comment. Upon receipt of SHPO concurrence work in the area may proceed.
5. If DCA's representative determines that the discovery is significant, the DCA will consult with the Navy and the SHPO to determine appropriate treatment for the discovered archeology.
6. Conduct appropriate protection or recovery, allowing SHPO 30 days to comment on planned work. Upon completion of protection or recovery, provide the Advisory Council on Historic Preservation with a report on the work.

Conversely, excavations of archeological sites may adversely affect natural resources. Any activities will be evaluated, as needed, via the NEPA process for such impacts. Adverse effects will be mitigated through avoidance, minimization, or compensatory mitigation.

In compliance with ARPA and the Antiquities Act, the exploration of archaeological sites will be prohibited except by qualified professionals under permit issued in accordance with NAVFACINST 11010.70A.

Locations and extent of Category I archeological resources will not be made public or provided to navy personnel other than on a need to know basis until such time as they may be displayed and interpreted in a manner that provides protection from vandalism.

In compliance with the Archeological and Historic Preservation Act of 1974, the curation of artifacts found during studies and dissemination of reports or documents produced will be conducted in accordance with 36 CFR 66.1-66.4. SUBASE Bangor will exercise caution to

insure that the resources are not inadvertently transferred, sold, demolished, altered, or allowed to deteriorate significantly.

10.0 Funding

Funding must be assured to provide for the continued management of all natural resources under this INRMP.

10.1 Forestry Funds

Forestry funds are generated from the sale of forest products. Forestry funds are centrally controlled by NAVFAC, and SUBASE Bangor is limited to recovering its authorized funding target for forest management.

Funds must be used only for items directly related to management of the forest ecosystem. Such items include timber management, reforestation, TSI, inventories, fire protection, construction and maintenance of timber area access roads, purchase of forestry equipment, disease and insect control, planning (including compliance with laws), marking, inspections, sales preparations, personnel training, and sales.

SUBASE Bangor will need forestry funds for Timber Stand Improvement projects, and in planning, preparing and administrating sales of timber. It will also be needed for mitigating activities following harvest, such as slash treatment and understory planting. The following amounts are estimated for forestry funds to implement this INRMP:

FY2000	\$ 97,000
FY2001	\$ 98,000
FY2002	\$101,000
FY2003	\$103,000
FY2004	\$106,000

10.2 Fish and Wildlife Funds

Fish and Wildlife Funds are collected from the sale of Recreation Harvest Permits to hunt or fish. The funds are authorized by the Sikes Act. These may be used only for fish and wildlife management on the installation where they are collected. They have no year-end expiration (unobligated funds carry over on 1 October).

SUBASE Bangor collects about \$5,000 of these funds from Recreational Harvest Permits each year. This is below the cost of administering the program. It is important to reduce the costs of administering the permit and access program to use these funds more directly on management of fish and wildlife. Thus, 2000 through 2004 will be a period of using automation and other cost saving measures to improve efficiency of this program. SUBASE has a surplus of oysters. It is planned that this surplus will be sold to the highest commercial bidder. Projected income from these sales is estimated at approximately \$10,000 per year.

10.3 Legacy Funds

In 1991, Congress instituted the DOD Legacy Resources Management Program to promote stewardship of natural and cultural resources. Individual projects will be reviewed to determine whether the projects meet Legacy guidelines. These funds may be appropriate for certain projects, but are not expected as annual support.

10.4 Environmental Funding

Environmental dollars are a special category of Operations and Maintenance (O&M) dollars, and are controlled by the Environmental Program Requirement report process. They are subject to the restrictions of O&M funds. The program heavily favors high-priority funding projects that need to obtain compliance with federal or state laws. Must fund classifications include carrying out mitigation measures required and identified within NEPA documents as well as items required within Federal Facilities Compliance Agreements and actions required by the Endangered Species Act.

Some environmental programs, such as landfill capping, have natural resources advantages. Proposed projects such as the development of storm water holding ponds, and land fill clean-up and capping will continue to be accomplished under the auspices of environmental programs, rather than being officially categorized as natural resources projects. These projects will continue to be funded with environmental funds, but they are not included as costs within the INRMP.

DOD Instruction 4715.3, *Environmental Conservation Program*, identifies the programming and budgeting priorities for conservation programs. Much of the inventories, assessments, and surveys needed to support ecosystem management implemented through the INRMP are classified as Class I – these actions have a higher priority for funding than actions that are not compliance driven. Class I also includes projects and activities needed that are not currently out of compliance, but shall be if projects are not implemented in the current program year.

Activities in these categories that are relevant to this INRMP include:

- Environmental analyses for natural (and cultural) resources conservation projects, and monitoring studies required to assess and mitigate potential impacts of the military mission on conservation resources.
- Baseline inventories of natural (and cultural) resources.
- Biological assessments, surveys, or habitat protection for a specific federally listed species, critical for the protection of the species so that proposed or continuing actions can be modified in consultation with the USFWS and/or NMFS to prevent an incidental take.

10.5 Recycling Funds

Funds are generated on SUBASE Bangor from the recycling program. SUBASE personnel recycle materials, which are sold to recycling centers. These recycling funds are used for a number of SUBASE welfare projects as well as for trail construction and maintenance.

11.0 Implementation

This portion of the INRMP addresses how the Plan will be carried out as a means of supporting the military mission through effective land stewardship. To that end, general management recommendations are made throughout this chapter.

11.1 *Mission-Related Planning Constraints and Opportunities*

The primary purpose of the INRMP installations covered in this plan is to perform a military mission; this sometimes requires natural areas to be disturbed or destroyed as part of the development of necessary facilities. These constraints on preservation, protection and enhancement of natural resources are overriding and may not be compromised. However, as outlined in this plan, there are also opportunities for restoration, enhancement and preservation of natural resources associated with mission activities. These are opportunities that must be realized to their fullest potential.

11.2 *Integration within Chapters of the INRMP and Between Resources Programs*

This document contains a wealth of information and suggestions regarding future operations of the INRMP areas covered. Inevitably, however, there will be conflicts between management schemes; in such instances, the needs of the military and personnel must be weighed against the ultimate environmental impacts of the proposed actions. It is these types of decisions that require a full integration of the various chapters of this plan. In effect, no decision regarding the management of an individual resource should be made without fully considering both the potential impacts to other resources and the possibility of additional consequences resulting from such a management decision.

As stated previously, this document is intended to develop recommendations that are not contradictory. However, there are general recommendations that, if implemented, may seem to contradict the overall goal of the plan. In these instances, an assessment should be performed prior to execution to determine whether or not the benefits of the project outweigh the losses associated with that particular natural resource. For example, management of an area for deer hunting by creating an edge-type vegetation community may impact the contiguous forest nature. In this case, the benefits associated with an increased deer population and successful hunting program would be weighed against the environmental impact of fragmenting forest areas.

Table 13 **INRMP PROJECT LIST**

DESCRIPTION	Chapt.	Est. Cost	Priority	Schedule	Funding
Species Survey at Camp W.H.	2&6.4	none	2	2002	NA
Species Survey at Toandos	2&6.4	none	2	2003	NA
Increase Partnerships	3.1.10	none	2	Annual	NA
Assess Shoreline Protection	4.5.2	none	2	Annual	NA
Erosion Source Survey	4.5.3	\$50,000	1	2001-2	ERN
Convert Lawn to Forest Habitat	4.8.3	\$5,000/yr	1	Annual	Forestry
Remove Scot's Broom	4&6	\$5,000/yr	3	open	Const. F.

Develop Urban Forest Plan	4.10	none	3	2003-4	NA
Evaluate Salt Marsh Habitat	4.11.1	none	3	Annual	NA
Wetland Diversity Planting	4.12.4	none	3	Annual	NA
Identify Soil Resources	4.13	none	3	open	NA
Reforestation	5.8.2	\$6,000/yr	1	Annual	Forestry
Timber Stand Improvement	5.8.2	\$6,000/yr	1	Annual	Forestry
Thinning for Habitat	5.8.2	\$10 K/yr	1	Annual	Forestry
Mature Harvest for Habitat	5.8.2	\$50 K/yr	1	Annual	Forestry
Forest Road Maintenance	5.8.2	\$10 K/yr	2	Annual	Forestry
Construction Timber Sales	5.8.2	\$18 K/yr	1	As Need	Forestry
Forest Inventory	6.4	\$50 K	2	FY2000	Forestry
Bear Study	6.4	Complete	1	2000	NA
Dear contraceptive Study	6.4	Complete	1	2000	NA
D. Hole Watershed Study	6.4	\$25 K/yr	1	2000-4	ERN
Fur Bearer Census	6.4	\$10 K	2	2001-3	ERN
Audubon Bird Surveys	6.4	\$25 K	1	Quarterly	ERN
Shellfish Census	6.4	none	2	Biannual	NA
Monitor Aquifer levels	6.4	none	1	Quarterly	NA
Monitor Aquifer for Salt Intrus.	6.4	none	1	Quarterly	NA
Mon. Habitat after Timber Sale	6.4	none	2	As Need	NA
Stream Habitat Surveys	6.4	none	2	Quarterly	NA
Cougar Census	6.4	\$5000	2	2004	Sikes \$
Install Nest Boxes & Perches	6.10.1	none	2	As Need	NA
Deer Hair Loss Studies	6.10.2	none	1	2000-2	NA
Deer Census	6.10.2	none	1	Annual	NA
Goose Control	6.10.2	none	3	Annual	NA
Conduct Hunting Program	6.10.5	none	1	Annual	NA
Enforce Fish & Game laws	6.10.6	none	1	On-going	NA
Small Mammal Survey	6.11.1	none	2	On-going	NA
Fish Hatchery Project	6.11.1	\$25 K	1	2002	ERN
Commercial Oyster Sale	6.11.1	none	2	As Need	NA
Camp WH Amphibian Study	6.11.2	\$12 K	1	2004	ERN
Camp WH Fur Bearer Study	6.11.2	\$10 K	1	2000 - 1	ERN
Camp WH Small Mammal Sur.	6.11.2	none	2	2002	NA
Camp WH Deer Survey	6.11.2	none	2	2001	NA
Camp WH Bear Study	6.11.2	\$5,000	3	2001 - 3	ERN
Camp WH Bird Survey	6.11.2	none	3	2002	NA
Toandos Fur Bearer Study	6.11.3	\$10 K	2	2000 - 1	ERN
Toandos Large Mammal Sur	6.11.3	none	3	2002	NA
Toandos Small Mammal Sur.	6.11.3	none	3	On-going	NA
Toandos Bird Survey	6.11.3	\$15K	2	2002	ERN
Fish Stocking	7.4.1	\$4,500/yr	1	Annual	Sikes
Establish Watchable Wildlife	8.16	none	3	On-going	NA
Construct Hiking Trails	8.16	\$50 K	3	On-going	Recycle

is dedicated to maintaining and improving the military mission at SUBASE Bangor. Plan implementation is a means to that end.

11.6 Research and Special Projects

11.6.1 Objectives

SUBASE Bangor is currently working with the Washington State Department of Fish and Wildlife and the University of Washington to determine the population levels of bear, along with gender, reproduction, and mortality data. This will include the capture of bear on SUBASE Bangor, and taking samples of blood, hair and scat for DNA analysis.

A contraceptive study is in progress on deer on SUBASE Bangor to determine if it is possible to use contraceptives in deer to limit reproduction in overpopulated areas. This is in cooperation with the United States Humane Society and Zoo Montana.

A study is being done with Washington State University and Washington State Department of Fish and Wildlife to determine causes and treatments of a “black-tailed deer hair loss syndrome” which has killed a number of deer in western Washington.

11.6.2 Research Mechanisms

The Bear study is done by the SUBASE Bangor biologist and staff. Collected specimens will be sent to the University of Washington for DNA analysis.

The contraceptive study is done by the SUBASE Bangor biologist and staff. Collected specimens are sent to veterinary schools at the University of California-Davis, University of Georgia, Washington State University, and Oregon State University for analysis.

The deer hair loss project has relocated deer onto the Washington State University campus for study. In addition to searching for causal agents, medication placed in salt blocks in the field is being analyzed for effectiveness.

11.6.3 Planned Research/Special Projects

A variety of tree cutting intensities and patterns will be tried over the next five years to improve the skills in creating desired wildlife habitat conditions.

A study to determine habitat use by cougar will be accomplished within the next five years.

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Appendix 2: Applicable Laws, Regulations and Policies

Federal law, Department of Defense (DOD) instructions and Department of Navy (DON) instructions provide the authority for the development of this INRMP. The attached laws and instructions are pertinent to the development of this INRMP. They are by no means the only laws or directives that may affect management of the natural and cultural resources.

CLEAN AIR ACT, 42 U.S.C. 7401-7671q, July 14, 1955, as amended

This Act, as amended, is known as the Clean Air Act of 1970. The amendments made in 1970 established the core of the clean air program. The primary objective is to establish federal standards for air pollutants. It is designed to improve air quality in areas of the country which do not meet federal standards and to prevent significant deterioration in areas where air quality exceeds those standards.

FEDERAL WATER POLLUTION CONTROL ACT (CLEAN WATER ACT), 33 U.S.C. 1251-1387, October 18, 1972.

The Clean Water Act, is a comprehensive statute aimed at restoring and maintaining the chemical, physical and biological integrity of the nation's waters. Primary authority for the implementation and enforcement rests with the U.S. Environmental Protection Agency (EPA).

ENDANGERED SPECIES ACT OF 1973 16 U.S.C. 1531-1544, December 28, 1973.

The Endangered Species Act provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species.

FEDERAL NOXIOUS WEED ACT OF 1974, 7 U.S.C. 2801-2814, January 3, 1975.

The Act provides for the control and management of nonindigenous weeds that injure or have the potential to injure the interests of agriculture and commerce, wildlife resources, or the public health.

MARINE MAMMAL PROTECTION ACT OF 1972, 16 U.S.C. 1361-1421h, October 21, 1972.

The Act establishes a federal responsibility to conserve marine mammals. Certain species and population stocks of marine mammals are or may be in danger of extinction or depletion due to human activities; these mammals should not be permitted to diminish below their optimum sustainable population.

MIGRATORY BIRD TREATY ACT 16 U.S.C. 703-712, July 3, 1918

The Migratory Bird Treaty Act implements various treaties and for the protection of migratory birds. Under the Act, taking, killing or possessing migratory birds is unlawful.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) of 1969 as implemented by E.O. 11514 and E.O. 11991

NEPA established national policies and goals for the protection of the environment. NEPA aims to encourage harmony between people and the environment, to promote efforts to prevent or eliminate damage to the environment and the biosphere, and to enrich the understanding of ecological systems and natural resources important to the country.

NATIONAL HISTORIC PRESERVATION ACT, 16 U.S.C. 470 et seq.

Requires Federal agencies to take account of the effect of any federally-assisted undertaking or licensing on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places. Provides for the nomination, identification (through listing on the National Register), and protection of historical and cultural properties of significance.

RIVERS AND HARBORS APPROPRIATION ACT OF 1899, 33 U.S.C. 403, March 3, 1899.

The Act prohibits the construction of any bridge, dam, dike, or causeway over or in navigable waterways of the U.S. without Congressional approval. The Act also prohibits the building of wharves, piers, jetties, and other structures without approval.

The SIKES ACT, 16 USC 670 and PL 86-797 as implemented by CFR 232

The Sikes Act requires all Department of Defense lands be managed for multiple uses and that integrated natural resource management plans be developed for all military installations which contain land and water areas suitable for the conservation and management of fish and wildlife resources.

Executive Order 11514 (1970), Protection and Enhancement of Environmental Quality

Federal agencies shall initiate measures needed to direct their policies, plans and programs so as to meet national environmental goals. They shall monitor, evaluate, and control agency activities to protect and enhance the quality of the environment.

Executive Order 11593 (1971), Protection and Enhancement of the Cultural Environment

All federal agencies are required to locate, identify, and record all cultural and natural resources. Cultural resources include sites of archaeological, historical or architectural significance. Natural resources include the presence of endangered species, critical habitat, and areas of special biological significance.

Executive Order 11990 (1977), Protection of Wetlands

Each Agency shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities.

Executive Order 11987 (1977), Exotic Organisms

Agencies shall restrict the introduction of exotic species into the natural ecosystems on lands and waters which they administer.

Executive Order 12088 (1978), Federal Compliance With Pollution Control Standards.

This executive order delegates responsibility to the head of each executive agency for ensuring that all necessary actions are taken for the prevention, control, and abatement of environmental pollution. This order gives the Environmental Protection Agency authority to conduct reviews and inspections to monitor Federal facility compliance with pollution control standards.

Executive Order 12898 (11 February 1994), Environmental Justice

This executive order requires certain federal agencies, including the DoD, to the greatest extent practicable permitted by law, to make environmental justice part of their missions by identifying and addressing disproportionately high and adverse health or environmental effects on minority and low-income populations.

Executive Order 13045 (21 April 1997), Protection of Children from Environmental Health and Safety Risks

The order makes it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children. It also directs agencies to ensure that policies, programs, activities, and standards address such risks if identified.

Executive Order 13112 (3 February 1999), Invasive Species

To prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.

DODDIR 4700.4 (DOD 1989)

The Department of the Navy is required to implement and maintain a balanced and integrated program for the management of natural resources. It states: "Conservation of natural resources and the military mission need not and shall not be mutually exclusive." DODDIR 4710.1 provides that planning requirements may be met in the integrated natural resources plan.

DODINST 4715.3, Environmental Conservation Program, May 1996

Implements policy and prescribes procedures for the integrated management of natural and cultural resources on property under DOD control. This includes a shift from single species to multiple species management, maintaining or restoring native ecosystems, and restoration of viable populations of native species while accommodating human use.

OPNAVINST 5090.1b (US Navy 1998) Chapter 22 4.1

Each naval installation having land or water areas suitable for the conservation and management of natural resources, or natural resources problems, are required to prepare a multiple-use Integrated Natural Resources Management Plan. This plan is to include all aspects of natural resources management applicable to the installation, future requirements, and projects to be accomplished. The instruction requires each INRMP to address the management of land, water, forests, fish, wildlife, endangered species, and outdoor recreation.

NAVFACINST P-73, Natural Resources Conservation and Management, 1975

Sets forth the authority, responsibility and procedures for the conservation and management of natural resources on land and water areas under the jurisdiction of the Department of the Navy. This includes conservation management of forest resources including timber sales and harvesting, reforestation, timber stand improvement, forest protection and all other elements related to timber production. A well-balanced forest resources program will complement programs for soil, water, fish and wildlife conservation.

SECNAVINST 6240.6E (US Navy 1980)

The Chief of Naval Operations and the Commandant of the Marine Corps is assigned the responsibility for the development and implementation of natural resources programs on all land and water areas under the jurisdiction of the Department of the Navy.

Appendix 3: Acronyms and Definitions

Acronyms

ARPA	Antiquities Permit
BOSC	Base Operating Security Contract (<i>Johnson Controls</i>)
CBU	Construction Battalion Unit
CEQ	Council on Environmental Quality
CES	Competitive Exclusion Stage
CFR	Code of Federal Regulation
DBH	Diameter Breast High
DCA	Departmental Consulting Archeologists
DNR	Washington State Department of Natural Resources
DOD	Department of Defense
DODDIR	Department of Defense Direction
DODINST	Department of Defense Instructions
DON	Department of the Navy
E#XXX	Estuarine Ecological System wetland identifier
(1)	Subtidal Ecological Subsystem
(OW)	Open Water
(US)	Unconsolidated Shore Class
(L)	Subtidal
(N)	Regularly Flooded
EA	Environmental Assessment
EFANW	Engineering Field Activity, Northwest
EHW	Explosive Handling Wharf
EPA	Environmental Protection Association
ESQD arcs	Explosive Safety Quantity Distance arc
FONSI	Finding of No Significant Impact
HARP	Historic and Archeological Resources Protection Plan
HCCC	Hood Canal Coordinating Council
HPA	Hydraulic Permit Application
IFCI	International Forestry Consultants Incorporated
IMFACPAC	Intermediate Maintenance Facility Pacific Northwest
INRMP	Integrated Natural Resources Management Plan
LEA	Law Enforcement Activities
LWD	Large Woody Debris
MBF	Thousand Board Feet
MMBF	Million Board Feet
MCSFCo	Marine Corps Security Force Company
MILCON	Military Construction
MLA	Main Limited Area
MWR	Morale, Welfare, and Recreation
NAD	Naval Ammunition Depot
NAVBASE	Naval Base
NAVCOMMTELSTA	Naval Computer and Telecommunication Station

NAVFACENGCOM	Naval Facilities Engineering Command
NAVFACINST	Naval Facilities Instructions
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOD	Naval Ordnance Depot
NTS	U.S. Naval Torpedo Station
NUWC	Naval Undersea Warfare Center
NUWES	Naval Undersea Warfare Engineering Station
NWI	National Wetlands Inventory
OPNAVINST	
PXXX	Palustrine Ecological System identifier
(AB)	aquatic bed
(EM)	emergent vegetation
(FO)	forested
(OW)	open water
(SS)	scrub/shrub vegetation
(A)	temporarily flooded
(C)	seasonally flooded
(F)	semipermanently flooded
(H)	permanently flooded
(K)	artificially flooded
(h)	diked/impounded
(x)	excavated
POMFPAC	POLARIS Missile Facility, Pacific
RXXX	Riverine Ecological System identifier
(2)	Upper Perennial Ecological Subsystem
(OW)	open water
(H)	permanently flooded
SECNAVINST	
SHPO	State Historic Preservation Office
SR	State Route
SUBASE	Naval Submarine Base
SUBGRU	Submarine Group
SUBRON	Submarine Squadron
SWFPAC	Strategic Weapons Facility, Pacific
TRIREFAC	TRIDENT Refit Facility
TRITRAFAC	TRIDENT Training Facility
TSI	Timber Stand Improvement
ULMS	Underwater Launched Missile System (Now TRIDENT)
U.S.	United States
USC	United States Code
USFWS	U.S Fish and Wildlife Service
WA	Washington State
WDFW	Washington State Department of Fish and Wildlife

Definitions

Eight hypothetical stages of forest ecosystem development in the Western Hemlock Zone of Washington and Oregon. Carey et al 1995.

Ecosystem Initiation (EIS)	Death or destruction of overstory trees by wildfire, windstorm, insects, disease, or timber harvesting leads to the establishment of a new plant community rapidly succeeded by other plant communities until trees dominate the ecosystem.
Competitive Exclusion (CES)	Trees fully occupy the site and compete with one another and other plants for light, water, nutrients, and space to the point where most other vegetation and many trees become suppressed and die.
Understory Reinitiation (URS)	Achievement of dominance by some trees and death of other trees leads to reduced competition that allows understory plants to become established.
Developed Understory (DUS)	Understories of forbs, ferns, shrubs, and trees have developed following death of some dominant canopy trees; there has been insufficient time for diversification of the plant community.
Botanically Diverse (BDS)	Organization and structure of the living plant community becomes complex with time and as the canopy opens further. Absence of coarse woody debris and other elements precludes developed a full, complex biotic community.
Niche Diversification (NDS)	Organization and structure of the biotic community becomes complex with aggradation of coarse woody debris, litter, soil organic matter, and botanical diversity; foraging needs of all forest vertebrates are met.
Fully Functional (FFS)	Additional ecosystem development provides habitat elements of the necessary large size and the time for development of function (interactions) to provide for the life requirements of diverse vertebrates, invertebrates, fungi, and plants.
Old Growth (OGS)	Forest ecosystems after >200 years of development uninfluenced by modern civilization that have achieved elements of large stature, great diversity, and complex function.

Appendix 4: SUBASE Bangor INRMP Species List

Birds

Western Grebe	<i>Aechmophorus</i>	Evening Grosbeak	<i>Coccothraustes-</i>
<i>occidentalis</i>		<i>pureus verpert</i>	
Sharp-shinned Hawk	<i>Accipiter stuatus</i>	Band-tailed Pigeon	<i>Columba fasciata</i>
Coopers's Hawk	<i>Accipiter cooperii</i>	Rock Dove	<i>Columba livia</i>
Spotted Sandpiper	<i>Actitis macularia</i>	Common Crow	<i>Corvus</i>
Red-winged Blackbird		<i>brachyrhynchos</i>	
<i>Agelaius phoenic</i>		Northwestern Crow	<i>Corvus caurinus</i>
Wood Duck	<i>Aix sponsa</i>	Common Raven	<i>Corvus corax</i>
Great Blue Heron	<i>Ardea herodias</i>	Steller's Jay	<i>Cyanocitta stelleri</i>
Mallard	<i>Anas platyrhynchos</i>	Downy woodpecker	<i>Dendrocopas</i>
Green-winged Teal	<i>Anas carolinensis</i>	<i>pubescens</i>	
White-Fronted Goose	<i>Anser albifrons</i>	Hairy Woodpecker	<i>Dendrocopas villosus</i>
Canvasback	<i>Aythya valisineria</i>	Townsend's Warbler	<i>Dendroica townsendi</i>
Greater Scaup	<i>Anthya marila</i>	Pileated Woodpecker	<i>Dryocopus pileatus</i>
Lesser Scaup	<i>Aythya affinis</i>	Western Sandpiper	<i>Ereunetes mauri</i>
Ruffed Grouse	<i>Bonasa umbellus</i>	Dunlin	<i>Erolia alpina</i>
Marbled Murrelet	<i>Brachyramphus</i>	Merlin (Pigeon Hawk)	<i>Falco columbaris</i>
<i>marmoratum</i>		Sparrow Hawk	<i>Falco sparverius</i>
Canada Goose	<i>Branta canadensis</i>	American Coot	<i>Fulica americana</i>
Great Horned Owl	<i>Bubo virginianus</i>	Common Loon	<i>Gavia Immer</i>
Common Goldeneye	<i>Bucephala clangula</i>	Yellow-billed Loon	<i>Gavia adamsii</i>
Barrow's Goldeneye	<i>Bucephala islandica</i>	Arctic Loon	<i>Gavia stellata arctica</i>
Bufflehead	<i>Bucephala albeola</i>	Northern Pygmy Owl	<i>Glaucidium gnoma</i>
Red-tailed Hawk	<i>Butes jamaicensis</i>	Bald Eagle	<i>Haliaeetus</i>
Common Snipe	<i>Capella gallinago</i>	<i>leucocephalus</i>	
Pigeon Guillemot	<i>Cephus columba</i>	Barn Swallow	<i>Hirundo rustica</i>
House Finch	<i>Carpodacus</i>	Varied Thrush	<i>Ixoreus naevius</i>
<i>mexicanus</i>		Dark-eyed (Oregon) Junco	<i>Junco</i>
Purple Finch	<i>Carpodacus</i>	<i>oreganus</i>	
<i>Puricanus</i>		Herring Gull	<i>Larus argentatus</i>
Rhinoceros Auklet	<i>Cerorhinca</i>	Ring-billed Gull	<i>Larus delawarensis</i>
<i>monocerata</i>		Mew Gull	<i>Larus canus</i>
Brown Creeper	<i>Certhia familiaris</i>	Glaucous-winged Gull	<i>Larus glaucescens</i>
Killdeer	<i>Charadrius vociferus</i>	Bonaparte's Gull	<i>Larus philadelphia</i>
Snow Goose	<i>Chen caerulescens</i>	Hooded Merganser	<i>Lophodytes cucullatus</i>
Night hawk	<i>Chordeiles minor</i>	California Quail	<i>Lophortyx</i>
Dipper	<i>Cinclus mexicanus</i>	<i>californicus</i>	
Northern Harrier (Marsh Hawk)	<i>Circus</i>	Red Crossbill	<i>Loxia curvirostra</i>
<i>cyaneus</i>		European Widgeon	<i>Mareca penelope</i>
Common (Red-shafted) Flicker		American Widgeon	<i>Mareca americana</i>
<i>Colaptes cafer</i>		Belted Kingfisher	<i>Megaceryle alayon</i>
		White-winged Scoter	<i>Melanitta deglandi</i>

Surf Scoter	<i>Melanitta</i>
<i>perspicillata</i>	
Song Sparrow	<i>Melospiza melodia</i>
Common Merganser	<i>Mergus merganser</i>
Red-breasted Merganser	<i>Mergus</i>
<i>serrator</i>	
Chilean Tinamou	<i>Nothoprocta</i>
<i>perdicaria</i>	
Snowy Owl	<i>Nyctea scandiaca</i>
Black (Common) Scoter	<i>Oidemia nigra</i>
Wild Turkey (Eastern)	<i>Ortalis vetula</i>
Screech Owl	<i>Otus asio</i>
Osprey	<i>Pandion haliaetus</i>
Black-capped Chickadee	<i>Parus</i>
<i>rufescens</i>	
Fox Sparrow	<i>Passerella iliaca</i>
House Sparrow	<i>Passer domesticus</i>
Rufous-sided Towhee	<i>Pipilo</i>
<i>erythrophthalmus</i>	
Double-crested Cormorant	<i>Phalacrocorax</i>
<i>auritus</i>	
Pelagic Cormorant	<i>Phalacrocorax</i>
<i>pelagicus</i>	
Ring-necked Pheasant	<i>Phasianus colchic</i>
Black-billed Magpie	<i>Pica pica</i>
Red-necked Grebe	<i>Podiceps grisegena</i>

Horned Grebe	<i>Podiceps auritus</i>
Eared Grebe	<i>Podiceps nigricollis</i>
Pied-billed Grebe	<i>Podilymbus podiceps</i>
Bushtit	<i>Psaltiriparus minimus</i>
Ruby-crowned Kinglet	<i>Regulus</i>
<i>calendis</i>	
Golden-crowned Kinglet	<i>Regulus</i>
<i>satrapula</i>	
Pine Siskin	<i>Spinus pinus</i>
American Goldfinch	<i>Spinus tristis</i>
Red-breasted Nuthatch	<i>Sitta</i>
<i>canadensis</i>	
Red-breasted Sapsucker	<i>Sphyrapicus</i>
<i>varius</i>	
Starling	<i>Sturnus vulgaris</i>
Bewick's Wren	<i>Thryomanes bewickii</i>
Greater Yellowlegs	<i>Totanus melanoleucus</i>
Winter Wren	<i>Troglodytes</i>
<i>troglodytes</i>	
Robin	<i>Turdus migratorius</i>
Common Barn Owl	<i>Tyto alba</i>
Hutton's Vireo	<i>Vireo huttoni</i>
Mourning Dove	<i>Zenaidura macroura</i>
White-crowned Sparrow	<i>Zonotrichia</i>
<i>leucophrys</i>	
Dowichers	<i>Limnodromus spp.</i>

Mammals

Mountain beaver	<i>Aplodontia rufa</i>
Feral dog	<i>Canis familiaris</i>
Coyote	<i>Canis latrans</i>
Beaver	<i>Castor canadensis</i>
California redback vole	<i>Clethrionomys occidentalis</i>
Townsend Chipmunk	<i>Eutamias townsendii</i>
Feral cats	<i>Felis domestica</i>
Mountain lion	<i>Felis concolor</i>
Bats	<i>Lasionycteris sp.</i>
Bats	<i>Lasurus sp</i>
River otter	<i>Lutra canadensis</i>
Bobcat	<i>Lynx rufus</i>
Striped skunk	<i>Mephitis mephitis</i>
Longtail vole	<i>Microtus longicaudus</i>
Oregon vole	<i>Microtus oregoni</i>
Shorttail weasel	<i>Mustela erminea</i>
Longtail weasel	<i>Mustela frenata</i>
Mink	<i>Mustela vison</i>
Bats	<i>Myotis sp.</i>
Bushytail woodrat	<i>Neotoma cinerea</i>
Blacktail deer	<i>Odocoileus hemionus</i>
Muskrat	<i>Ondatra zibethica</i>
Deer mouse	<i>Peromyscus maniculatus</i>
Harbor seal	<i>Phoca vitulina</i>
Raccoon	<i>Procyon lotor</i>
Townsend mole	<i>Scapanus townsendii</i>
Pacific mole	<i>Scapanus orarius</i>
Shrew	<i>Sorex sp.</i>
Spotted skunk	<i>Spilogale putorius</i>
Brush rabbit	<i>Sylvilagus bachmani</i>
Chickaree	<i>Tamiasciurus douglasii</i>
Mazama pocket gopher	<i>Thomomys mazama</i>
Black bear	<i>Ursus americanus</i>
Fox	<i>Vulpes fulva</i>
Western jumping mouse	<i>Zapus trinotatus</i>

Amphibian and Reptiles

Northwestern Salamander	<i>Ambystoma gracile</i>
Long-toed Salamander	<i>Ambystoma macrodactylum</i>
Western Toad	<i>Bufo boreas</i>
Northern Alligator Lizard	<i>Elgaria coerulea</i>
Ensatina	<i>Ensatina eschscholtzii</i>
Pacific Treefrog	<i>Hyla regilla</i>
Western Redbacked Salamander	<i>Plethodon vehiculum</i>
Red-legged Frog	<i>Rana aurora</i>
Bullfrog	<i>Rana catesbeiana</i>
Rough-Skinned Newt	<i>Taricha granulosa</i>
Garter Snake	<i>Thamnophis elegans</i>
Garter Snake	<i>Thamnophis ordinoides</i>
Garter Snake	<i>Thamnophis sirtalis</i>

Fish and Shellfish

White Sturgeon	<i>Acipenser</i>	Rex Sole	<i>Glyptocephalus</i>
<i>transmontanus</i>		<i>zachirus</i>	
Sturgeon Poacher	<i>Agonus acipenserinus</i>	Flathead Sole	<i>Hippoglossoides</i>
Pacific Sand Lance	<i>Ammodytes hexaptrus</i>	<i>elassodon</i>	
High Cockscomb	<i>Anoplarchus</i>	Rock Sole	<i>Lepidopsetta bilineata</i>
<i>purpurescens</i>		Slender Sole	<i>Lyopsetta exilis</i>
Sablefish	<i>Anoplopoma fimbria</i>	Hairy Shore Crab	<i>Hemigrapsus</i>
Penpoint Gunnel	<i>Apodichthys flavidus</i>	<i>oregonensis</i>	
Padded Sculpin	<i>Artedius fenestralis</i>	Red Irish Lord	<i>Hemilepidotus</i>
Scalyhead Sculpin	<i>Artedius harringtoni</i>	<i>hemilepidotus</i>	
Smoothhead Sculpin	<i>Artedius lateralis</i>	Kelp Greenling	<i>Hexagrammos</i>
Spinycheek Starsnout	<i>Asterotheca</i>	<i>decagrammus</i>	
<i>infraspinata</i>		Whitespotted Greenling	<i>Hexagrammos</i>
Arrowtooth Flounder	<i>Atheresthes stomias</i>	<i>stelleri</i>	
Tube-snout	<i>Aulorhynchus flavidus</i>	Rock Scallop	<i>Hinnites giganteus</i>
Dungeness Crab	<i>Cancer magister</i>	Ratfish	<i>Hydrolagus collieri</i>
Red Rock Crab	<i>Cancer productus</i>	Surf Smelt	<i>Hypomesus pretiosus</i>
European Green Crab	<i>Carcinus maenas</i>	Pacific Staghorn Sculpin	<i>Leptocottus</i>
Roughback Sculpin	<i>Chitonotus pugetensis</i>	<i>armatus</i>	
Pacific Sanddab	<i>Citharichthys</i>	Ribbon Snailfish	<i>Liparis cyclopus</i>
<i>sordidus</i>		Showy Snailfish	<i>Liparis pulchellus</i>
Speckled Sandab	<i>Citharichthys</i>	Pacific Snake Pickleback	<i>Lumpeneus</i>
<i>stigmaeus</i>		<i>sagitta</i>	
Basket Cockle	<i>Clinocardium nuttallii</i>	Wattled Eelpout	<i>Lycodes palearis</i>
Sharpnose Sculpin	<i>Clinocottus acuticeps</i>	Blackbelly Eelpout	<i>Lycodopsis pacifica</i>
Arrow Goby	<i>Clevelandia ios</i>	Dwarg Wrymouth	<i>Lyconectes aleutensis</i>
Pacific Herring	<i>Clupea harengus</i>	Bent-nosed clam	<i>Macoma nasuta</i>
<i>pallasi</i>		Sand Clam	<i>Macoma secta</i>
Blackeye Goby	<i>Coryphopterus</i>	Blackfin Sculpin	<i>Malacocottus kincaidii</i>
<i>nicholsi</i>		Pacific Hake	<i>Merluccius productus</i>
Pacific Oyster	<i>Crassostrea gigas</i>	Pacific Tomcod	<i>Microgadus proximus</i>
Shiner Perch	<i>Cymatogaster</i>	Dover Sole	<i>Microstomus</i>
<i>aggregata</i>		<i>pacificus</i>	
Spinyhead Sculpin	<i>Dasycottus setiger</i>	Eastern Soft Shell Clam	<i>Mya arenaria</i>
Striped Seaperch	<i>Embiotoca lateralis</i>	Bay Mussel, Blue Mussel	<i>Mytilus edulis</i>
Northern Anchovy	<i>Engraulis mordax</i>	Sailfish Sculpin	<i>Nautichthys</i>
Buffalo Sculpin	<i>Enophrys bison</i>	<i>oculofasciatus</i>	
Pacific Lamprey	<i>Entosphenus</i>	Pygmy Poacher	<i>Odontopyxis</i>
<i>tridentatus</i>		<i>trispinosa</i>	
Pacific Cod	<i>Gadus macrocephalus</i>	Tidepool Sculpin	<i>Oligocottus</i>
Threespine Stickleback	<i>Gasterosteus</i>	<i>maculosus</i>	
<i>aculeatus</i>		Pink Salmon	<i>Oncorhynchus</i>
Soft Sculpin	<i>Gilbertidia sigalutes</i>	<i>gorbuscha</i>	
		Chum Salmon	<i>Oncorhynchus keta</i>

Coho Salmon	<i>Oncorhynchus</i>
kitsutch	
Chinook Salmon	<i>Oncorhynchus</i>
<i>tshawytscha</i>	
Painted Greenling	<i>Oxylebius pictus</i>
Hood Canal Shrimp	<i>Pandalus danae</i>
Geoduck	<i>Panope generosa</i>
English Sole	<i>Parophrys vetulus</i>
Lingcod	<i>Phiodon elongtus</i>
Crescent Gunnel	<i>Pholis laeta</i>
Saddleback Gunnel	<i>Pholis ornata</i>
Starry Flounder	<i>Platichthys stellatus</i>
Bluebarred Prickleback	
	<i>Plectobranchnus evides</i>
Silverspotted Sculpin	<i>Plepsias cirrhosus</i>
C-O Sole	<i>Pleuronichthys</i>
	<i>coenosus</i>
Rock Oyster; Jingle Shell	<i>Pododesmus</i>
	<i>macroschisma</i>
Plainfin Midshipman	<i>Porichthys notatus</i>
Native Littleneck Clam	<i>Protothaca</i>
	<i>staminea</i>
Sand Sole	<i>Psettichthys</i>
	<i>melanostictus</i>
Tadpole Sculpin	<i>Psychrolutes</i>
	<i>paradoxus</i>
Slim Sculpin	<i>Radulinus asprellus</i>
Big Skate	<i>Raja binocularata</i>
Longnose Skate	<i>Raja rhina</i>
Pipe Perch	<i>Rhacochilus vacca</i>
Northern Ronquil	<i>Ronquilus jordani</i>
Cutthroat Trout	<i>Salmo clarki</i>
Rainbow Trout	<i>Salmo gairdneri</i>
Butter Clam	<i>Saxidomus giganteus</i>
Cabazon	<i>Scorpaenichthys</i>
	<i>marmoratus</i>
Brown Rockfish	<i>Sebastes auriculatus</i>
Copper Rockfish	<i>Sebastes caurinus</i>
Greenstriped Rockfish	<i>Sebastes</i>
	<i>elongatus</i>
Yellowtail Rockfish	<i>Sebastes flavidus</i>
Quillback Rockfish	<i>Sebastes malinge</i>
Black Rockfish	<i>Sebastes melanops</i>
Jackknife Clam	<i>Soleu sicarius</i>
Spiny Dogfish	<i>Squalus acanthias</i>
Manacled Sculpin	<i>Synchirus gilli</i>

Bay Pipefish	<i>Syngathus</i>
<i>leptorhynchus</i>	
Manila Clam; Japanese Littleneck Clam	
	<i>Tapes Japinica</i>
Helmet Crab	<i>Telmessus</i>
	<i>cheiragonus</i>
Walleye Pollock	<i>Theragra</i>
	<i>chalcogramma</i>
Pacific Electric Ray	<i>Torpedo californica</i>
Horse Clam	<i>Tresus capox</i>
Horseneck Clam	<i>Tresus nuttallii</i>
Rough spine Sculpin	<i>Triglops macellus</i>
Blacktip Poacher	<i>Xeneretmus latifrons</i>

Plants

Grand Fir	<i>Abies grandis</i>	Seashore Saltgrass	<i>Distichlis spicata</i>
Vine Maple	<i>Acer circinatum</i>	Fireweed	<i>Epilobium</i>
Bigleaf Maple	<i>Acer macrophyllum</i>	<i>angustifolium</i>	
Western Yarrow	<i>Achillea millefolium</i>	Marsh Horsetail	<i>Equisetum palustre</i>
Deerfoot Vanilla-leaf	<i>Achlys triphylla</i>	Coast Strawberry	<i>Fragaria chiloensis</i>
Western Maiden-hair Fern	<i>Adiantum</i>	Oregon bedstraw	<i>Galium oreganum</i>
<i>pedatum</i>		Salal	<i>Gaultheria shallon</i>
Red Alder	<i>Alnus rubra</i>	Rattlesnake Plantain	<i>Goodyera</i>
Pale Service-berry	<i>Amelanchier pallida</i>	<i>oblongifolia</i>	
European Beach-grass	<i>Ammophila</i>	Gumweed	<i>Grindela integrifolia</i>
<i>arenaria</i>		Oceanspray	<i>Holodiscus discolor</i>
Pearly Everlasting	<i>Anaphalis</i>	Common St. Johnswort	<i>Hypericum</i>
<i>margaritacea</i>		<i>perforatum</i>	
Pacific madrone	<i>Arbutus menziesii</i>	Duckweed	<i>Lemna minor</i>
Hairy Manzanita	<i>Arctostaphylos</i>	Parsleyleaf Licoriceroot	<i>Ligusticum</i>
<i>Columbiana</i>		<i>apiifolium</i>	
Kinikinnick	<i>Arctostaphylos uva-</i>	Twinflower	<i>Linnaea borealis</i>
<i>ursa</i>		Bearberry Honeysuckle	<i>Lonicera</i>
Wild Ginger	<i>Asarum caudatum</i>	<i>involucrata</i>	
Douglas Aster	<i>Aster subspicatus</i>	Shore Lupine	<i>Lupinus littoralis</i>
Saltweed	<i>Atriplex patula</i>	Skunkcabbage	<i>Lysichitum</i>
Lady Fern	<i>Athyrium filix-femina</i>	<i>americanum</i>	
Tall Oregongrape	<i>Berberis aquifolium</i>	Common Tarweed	<i>Madia gracilis</i>
Oregongrape	<i>Berberis nervosa</i>	Monkey Flower	<i>Mimulus guttatus</i>
Northwestern Paper Birch	<i>Betula</i>	Miner's Lettuce	<i>Montia perfoliata</i>
<i>papyrifera</i>		Yellow Pond Lily	<i>Naphar polysepalum</i>
Deerfern	<i>Blechnum spicant</i>	Water Cress	<i>Nasturtium officinale</i>
Ground-cone	<i>Boschniakia</i>	Water Parsley	<i>Oenanthe sarmemntosa</i>
<i>strobilacea</i>		Devilsclub	<i>Oplopanax horridum</i>
Pacific Reedgrass	<i>Calamagrostis</i>	Indian Plum	<i>Osmaronia</i>
<i>nutkaensis</i>		<i>cerasiformis</i>	
Calypso	<i>Calypso bulbosa</i>	Oregon Oxalis	<i>Oxalis oregana</i>
Northwestern Sedge	<i>Carex concinnoides</i>	Reed Canarygrass	<i>Phalaris arundinacea</i>
Snowbrush	<i>Ceanothus velutinus</i>	Sitka spruce	<i>Picea sitchensis</i>
Common Thistle	<i>Cirsium vulgare</i>	Lodgepole Pine	<i>Pinus contorta</i>
Queencup Beadlily	<i>Clintonia uniflora</i>	Western White Pine	<i>Pinus monticola</i>
Spotted Coralroot	<i>Corallorhiza</i>	Smartweed	<i>Polygonum</i>
<i>maculata</i>		<i>punctatum</i>	
Pacific dogwood	<i>Cornus nuttallii</i>	Licorice Fern	<i>Polypodium vulgare</i>
Hawthorn	<i>Crataegus douglasii</i>	Quaking Aspen	<i>Populus tremuloides</i>
Scotch broom	<i>Cytisus scoparius</i>	Black Cottonwood	<i>Populus trichocarpa</i>
Orchard Grass	<i>Dactylis glomerata</i>	Pondweed	<i>Potamogeton sp.</i>
Foxglove	<i>Digitalis purpurea</i>	Bitter Cherry	<i>Prunus emarginata</i>
Common Teasel	<i>Dipsacus sylvestris</i>		

Douglas-fir	<i>Pseudotsuga</i>
<i>menziesii</i>	
Bracken Fern	<i>Pteridium aquilinum</i>
Oregon White Oak	<i>Quercus garryana</i>
Buttercup	<i>Ranunculus sp.</i>
Cascara	<i>Rhamnus purshiana</i>
Pacific Rhododendron	<i>Rhododendron</i>
<i>macrophyllum</i>	
Gooseberry	<i>Ribes menziesii</i>
Nootka Rose	<i>Rosa nutkana</i>
Thimbleberry	<i>Rubus parviflorus</i>
Salmonberry	<i>Rubus spectabilis</i>
Trailing Blackberry	<i>Rubus ursinus</i>
Pickleweed	<i>Salicornia virginica</i>
Coast Willow	<i>Salix hookeriana</i>
Scouler's Willow	<i>Salix scouleriana</i>
Red Elderberry	<i>Sambucus racemosa</i>
Pacific Coast Bulrush	<i>Scirpus pacificus</i>
Spreading Stonecrop	<i>Sedum divergens</i>
Douglas spirea(hardhack)	<i>Spiraea</i>
<i>douglasii</i>	
Common Chickweed	<i>Stellaria media</i>
Common Snowberry	<i>Symphoricarpos albus</i>
Common Dandelion	<i>Taraxacum officinale</i>
Western Yew	<i>Taxus brevifolia</i>
Western redcedar	<i>Thuja plicata</i>
Starflower	<i>Trientalis latifolia</i>
White Trillium	<i>Trillium ovatum</i>
Western Hemlock	<i>Tsuga heterophylla</i>
Stinging Nettle	<i>Urtica dioica</i>
Evergreen Huckleberry	<i>Vaccinium</i>
<i>ovatum</i>	
Red Huckleberry	<i>Vaccinium</i>
<i>parvifolium</i>	
American Vetch	<i>Vicia americana</i>
Upland Yellow Violet	<i>Viola nuttallii</i>